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THE

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AND OF

THE INSTITUTIONS IN UNION.

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Announcements by the Council.

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ORDINARY MEETINGS.

Wednesday Evenings at 8 o'clock.

MARCH 1.—"On the Means employed in taking Fish, especially with reference to Submarine Illumination." By F. W. CAMPIN, Esq.

MARCH 8.—"On Cotton Gins." By ZERAH COLBURN, Esq.

CANTOR LECTURES.

The Second Course of Cantor Lectures, the subject being "The Applications of Geology to the Arts and Manufactures," by Professor D. T. ANSTED, M.A., F.R.S., is now being delivered on Monday evenings, at Eight o'clock, as follows:—

FEB. 27TH.—LECTURE 4.—On Mineral Materials (*continued*): Building Stones and Slates, and their Relative Value under given Circumstances of Exposure, and on Methods of Quarrying.

MARCH 6TH.—LECTURE 5.—On Stratified Deposits of Minerals, as Coal and Iron Ore, usually obtained by Mining Operations, and on Mining Methods for such Deposits.

MARCH 13TH.—LECTURE 6.—On Metalliferous Veins or Lodes and their Contents, and on the Extraction of Metalliferous Minerals from Lodes.

These Lectures are free to Members (without ticket), and every Member has the privilege of admitting ONE Friend to each Lecture.

INSTITUTION.

The following Institution has been received into Union since the last announcement:—

Huddersfield Mechanics' Institution.

Proceedings of the Society.

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CANTOR LECTURES.

SECOND COURSE.—THIRD LECTURE.—MONDAY, FEB. 20.

MINERALS OBTAINED FROM SUPERFICIAL DEPOSITS.

Professor ANSTED stated that he next proposed to speak of mineral substances used for special practical purposes. Of these there are several classes:—(1.) Sands used in manufacture, or for casting. (2.) Sands and gravels consisting partly of gold, diamonds, tin ore, &c. (3.) Plastic clays. (4.) Limestones used in construction after burning. (5.) Building stones. (6.) Coal, iron stone, etc., forming strata in the earth. (7.) Ores in mineral veins. In his address this evening he meant to allude to the first four of these classes. *Silica sand* is valuable in glass making. Samples free from foreign substances are obtained from rocks of various geological ages; among others, from the beds at the bottom of the tertiary series at Alum bay, Isle of Wight, where the quality is very good, and adapted for the best flint glass. Others are from the Hastings sands; from the lower greensand at Aylesbury; from the sands of Reigate, and from near Falmouth harbour and other places on the coast of Cornwall. A peculiar kind of sand is obtained not far from Bath, and is known as Bath stone. It is used for polishing. It consists chiefly of the cases of infusorial animalcules accumulated in beds, and consisting of almost pure silica in a fine state of division. Tripoli, or rotten stone, is somewhat similar, and is obtained from limestone of the carboniferous series. The polishing powder of Bilin, near Berlin, is of the same nature, and has the same origin. Sands and gravels often contain fragments of such metals and minerals as can be broken or ground up into minute particles, and are not readily decomposed by weathering. These include diamonds, amber, iron ore, tin ore, and gold. Some are rare, others common. Some occupy a small space in the sand or gravel that contains them, but others form the principal part of such material. Diamond washings are carried on in India and Brazil. The process of exploring is simple enough; the implement being a pick-axe, with which men dig into every promising spot. The diamond matrix is first picked out from the loose pebbles, and the selected mass spread out on a flat surface, where it can be examined grain by grain. The earth sought for is a red ochrey clay, containing oxide of iron; but diamonds are also found in the loose mud. Alluvial ores may be included in one general description. Gold, and the oxides of tin and iron, are found in important quantities, and the treatment of tin ore and gold requires separate notice. Stream tin occurs in Cornwall, but the chief supply is from the Island of Banca, in the Eastern Archipelago. Gold is chiefly obtained from sands and gravels derived from some parent rock or vein, but detached, and rarely affording a clue to its origin. Such sands are found in Europe, in certain parts of Siberia, in Africa, especially on the west coast, in Brazil, Mexico, California, Colombia, Australia, and New Zealand. Gold is found in river beds, and in ancient detritus. The banks of the Rhine and Danube, and the sands of the Tagus are auriferous. The washing of gold alluvia is a very simple matter. A wooden bowl, shaken artificially with water, separates the heavier from the lighter mud. The latter is floated off until a residuum of gold is obtained. Each country and river bed has its own indications. In some the gold is found in dust, or spangles floated away by water. In others the particles are grains, and resist the current. Sometimes heavier grains or nuggets are found; native platinum and rare metals often occur with them. These deposits may be brought down from great distances, where the gold-bearing veins crop out. More usually the auriferous mud is but the washing of auriferous sands and gravels long since accumulated. Thus, in the Rhine, the mud is derived from a sand bank above the place of working. The gold is found in flakes or spangles so exceedingly minute and thin that it needs fourteen hundred to weigh a single grain. A cubic yard of the mud will contain from five to forty thousand of these spangles. Compared with Siberia and South America, these Rhine sands are very poor, the Siberian gravels yielding five times, and those of Chili ten times as much. The Siberian gravels are coarse, being composed of shingle of fragments of the adjacent rock. They occur along the eastern flank of the Ural chain, both in the north and south valleys, and in those which run transversely. The former are generally the richer. The gold alluvia of Siberia are of definite geological age, and belong to the boulder gravels deposited by ice during the glacial period. The Brazil auriferous deposit is called *Cascalho*. It is an indurated soil broken up with pick-axes, and afterwards exposed to a current of water, or a loose gravelly stratum of rounded pebbles. It rests on granite, and is covered by earthy matter. Its thickness is very variable. The Californian gravels consist of coarse and small stones, mixed with mud and fine sands. Some of these are the actual beds of the existing streams; but the great deposits of such material have been already made, and are not now in progress. In Australia the gold-bearing gravels are deep, and seem to carry gold throughout. Shafts sunk through them to a couple of hundred yards reach gold, and the heaviest and largest lumps of gold have been found at the lowest depths. The most important recent discoveries of rich gold alluvia are those of British Columbia, New Zealand, and Nova Scotia. In all these gold has been found by prospecting, the first discovery being accidental. In the rivers or gullies opening out from the mountains, there are sands and gravels containing the gold in minute specks, visible grains, and now and then great nuggets. These latter are the temptation to the adventurous miner, and, at rare intervals, several of unusual size are found in the same locality. As a specimen was mentioned a case in the gravels of British Columbia. Five partners commenced working at Cariboo, in 1861. During the first three days they obtained little. On the fourth day they raised 4 ozs.; on the fifth day, 10 ozs.; and on the sixth, 41 ozs. of gold. The yield went on increasing until it reached 387 ozs. in one day, and the last day's work resulted in the obtaining of 469 ozs. The total value of the gold raised was upwards of £20,000, and the dimensions of the claim were only 80 feet by 25 feet superficial. The economical working of auriferous deposits is a matter of practical importance. The methods adopted are nearly the same as those in use in Cornwall for reducing tin ore. The cost of crushing gold quartz would, no doubt, be somewhat greater than in Cornwall, but the operation may be profitable, even when the percentage of the precious metal is extremely small, provided the quantity of ore is sufficiently large. Gold gravels sometimes contain the following crystals and native metals:—Sapphire, topaz, spinel-ruby, zircon, tourmaline, garnets, olivine, platinum, palladium, osmium, stream tin, diamonds, and quartz. All the productive streams for tin ore are in the valleys on the southern side of the Cornish peninsula, although most of the richest veins of such ore are on the northern side. Here we have evidence of a drift from the north conveying the tin; and a similar conclusion must be drawn from the facts concerning the principal gold drifts north of a certain line in Europe and Asia. But how is it that such a drift, produced by a submarine current or wave flooding the land, can have deposited the stream ores? This involves a consideration of the mode in which the granite districts of Cornwall have been decomposed. Those who know the infinite multitude of small veins and branches carrying tin ore that traverse the easily decomposed granites of St. Austell and its neighbourhood, will not doubt that if a body of water were now to rush across that part of our island, the decomposed granite would be removed, the broken up quartzy strings containing tin would be rolled into pebbles, and the tin-bearing pebbles would be separated. Owing to their greater specific weight these pebbles would first come to rest, and if once drifted into hollows would not easily be removed. On the other hand, the lighter material would be much further transported. It is difficult to form an idea of the original extent of the accumulations of tin stone gravels that have been the object of incessant exploration for several thousand years in Cornwall. There are perpetual indications of former workings, at intervals, along the whole distance from Dartmoor to the Land's End, and the ground has often been turned over twice or thrice. But there is still sufficient unmoved ground to illustrate the general geological facts. The stream works mark great changes in level as well as causes of drift, now unknown in the district. The upper limit of the tin ground in Pentuan was 48 feet below the level of high water at spring tides and 30 feet below the level of low water, but it was once covered with vegetable soil, and the land at that time possessed human inhabitants. In many other instances, as well as *this*, there is unmistakable evidence of depression, to the extent of at least fifty feet within the human period, without the smallest evidence of any great earthquake disturbance or any change in the dip of the rocks. It is also certain that the depression has been general over an extensive area, and that it has been very gradual. On the other hand, there is equally good evidence in Cornwall itself and in the adjacent county of Devon, that in many places there has been local elevation, to an extent even much greater than this depression, and also within the human period. It must be remembered that, while sometimes the valuable minerals, being heavy, are left behind and deposited at the bottom; in others they are lighter than other stones, floated onwards, and caught up accidentally, or left permanently at the top. This is the case with amber—the ancient resinous excretion of certain extinct pines. On the shores of the Baltic, pits are occasionally sunk through loose sand to a hundred feet, with a view of reaching the fragments of this substance in the uppermost of the regular strata below the sand. Elsewhere the amber is floated or drifted to shore during storms, and is then picked up before it is caught and covered up by the blown sands. The lecturer then proceeded to the consideration of plastic materials. Four varieties of clay are used in the arts, each having its own peculiar properties, and each available for some special purpose. They are brick clay, fire clay, pipe clay, and pottery or porcelain clay. Brick clays are widely spread, and few countries are without some varieties. In England they are common, often forming very thick and extensive beds. The clays of any locality are almost always used for brick-making for common purposes in the district where they occur; for clay will not readily bear the cost of conveyance. The finer kinds are different, being conveyed in a prepared state to the place of manufacture. Brick clays consist of a coarse and irregular admixture of pure clay—with sand, lime, iron, carbon, mineral alkalis, and a host of impurities. The admixture with sand is essential; and the proportion of sand in clay, as well as the composition of clay, admit of great variety. The clay must be free from large stones; but the admixture of a large percentage of silica-sand is not incompatible with the formation of an excellent brick. The number of stock bricks annually manufactured and used in England must exceed one thousand million; and brick-pits have been opened in the neighbourhood of every town in which dressed stone is more expensive than brick. Generally, iron, lime, potash, or soda are unfavourable signs in a brick clay; for they would cause the brick to run in the furnace. By burning clay loses the capacity of mixing with water, and its plasticity. It becomes hard, resists weathering; and if iron has been present, it converts the dull brown of the clay into a bright red. To make a good brick, the clay must be freed from pebbles and ground up into a uniform mass. In preparing for manufacture, it must be mixed with coarse sharp sand. In a good brick clay there should not be more than 2 per cent. of lime or potash. Fire-clay is a variety that bears intense heat without melting; and fire-bricks should bear exposure in the interior of furnaces. The alkalies, alkaline earths, and iron-oxide, which would help to flux it, are absent. Fire-clays often contain carbon, and some are the floors beneath seams of coal. Of other clays some are adapted for coarse pottery; others for finer kinds of ware; others for the whitest and best kinds. There are also pipe clays, and, lastly, *Ka-o-lin*, found not only in China but in Cornwall and West Devon, in Central France, and in Northern Germany. Pottery clays are more plastic than brick clays, and resist the most intense heat of the furnace. They contract with much irregularity, and the iron they contain communicates a colour, varying in intensity with the quantity of the metal. Pottery clay is used for some manufactures little superior to ordinary brick or tile, and others hardly inferior to porcelain. No precise line can be drawn concerning them, nor does analysis strictly define their value. The raw material results from a separation of coarse and impure parts of common clay by water and exposure to weather. Pipe clay is a variety containing an excess of silica and very little iron. China clay is formed by a natural or artificial washing from the decomposed felspar of certain kinds of granite. It is of a loose earthy texture, and light (s.g. 2·21 to 2·26). The composition varies from different localities, the limits being wide. The preparatien of china clay for the potteries is simple, and consists in washing the decomposed rock in a succession of tanks, so that the particles of quartz, mica, and other minerals, may either fall from the water in which they were mechanically suspended, or be carried forwards by the velocity of the stream; while the fine particles, consisting of the remains of the decomposed felspar are allowed to settle quietly in tanks prepared for them. The decomposition of the granite leaves the quartz in stones, which are generally crystalline and angular. These are got rid of in a catch-pit, through which the whole is carried along by a current of water. The operation of washing has been performed naturally, both in Cornwall and Devonshire. The decomposed granite has been washed through a valley, the coarse particles of quartz being left in the upper part of the valley, and the particles of fine sand brought to the lower part. More than 10,000 tons of the finer and three times as much of the commoner kinds of clay are annually made use of in the Staffordshire potteries. Cements and plasters were next noticed. Their use is very ancient. They are of various kinds, and available under very different circumstances. The most common and familiar is *mortar*. It is obtained by calcining limestone, and converting it into quicklime. After calcining quicklime is a greyish substance, which absorbs water with the evolution of much heat, and falls into a fine powder, which is next mixed with two or three times its own weight of sharp sand to form mortar. In time a film of silicate of lime is formed round each grain of sand, and the whole mass, and the stones between which it is placed, become closely adhered. As there are different kinds of limestone, there result limes of different quality and properties. These require special treatment. Marbles or chalk make a rich lime, setting firmly only in dry air, while the very impure limestones with which clay is largely mixed, result in hydraulic limes, which set more or less rapidly in moist air, or even under water. Some impure limestones ars used in the manufacture of cements. Sometimes, by the admixture of certain substances (as puzzuolana) with rich limes instead of sand, hydraulic limes are produced. It is not difficult to trace the changes that take place in the conversion of limestones into cement. A layer of mortar, not too thick, placed between bricks or stone and kept in dry air, dries gradually, and holds stones together with extraordinary tenacity. But this is a work of years, and sometimes even centuries must run out before the extreme of hardness is attained. It is not unusual to find imperfectly-hardened mortar in very old constructions. Limestone is widely distributed, and almost every variety can be burnt for lime. In the manufacture of good common mortar pure limestones and all of fair ordinary quality are available: but in using them attention must be given to their composition, and even texture. The hardest make the fattest lime, other things being the same; but each variety yields lime of different quality—distinct in colour, in weight, and in the greediness with which it absorbs water. The mode of calcination varies, but after burning limestones, the quicklime is lighter than the ordinary stone, and differs from it essentially. Limestones that contain from one to six per cent. of foreign substances, such as silica, alumina, magnesia, iron, &c., yield rich limes. Poor limes are obtained from limestones in which foreign substances, such as sand, carbonate of magnesia, oxides of iron, and manganese, are present to the extent of from 15 to 30 per cent. These increase little in bulk on slacking, do not set under water, and are soluble, like the rich limes, except that they leave an earthy residuum. Between eminently rich and eminently poor limes there is, of course, every gradation, and great importance is attributed to the state of the limestones and the nature of the foreign substances present. Fossiliferous limestones make bad mortar, as the slacking is irregular. Limestones containing much silica swell in setting, and dislocate masonry executed with them. Where alumina is in excess the lime is apt to shrink and crack. Where carbonate of magnesia is combined with carbonate of lime, as in the magnesian limestones, the original bulk is well retained. Hydraulic limes are of very great value in construction. They are either obtained naturally from the burning of certain varieties of calcareous rock, or are manufactured artificially by mixing limestones with foreign ingredients, or by combining quicklime with foreign materials. Roman cement, Portland cement, Parker's cement, and many others, are varieties of artificial cement. Nodules and argillaceous bands in clay deposits yield the largest quantity and best quality of limestones for burning into hydraulic lime. The limestone is argillaceous and combined with other impurities, among which iron oxide and carbon are very frequent. It is generally considered that from 15 to 25 per cent. of a limestone should consist of silicate of alumina, in order that it may burn into a good hydraulic lime. Such limestone is got from the *septaria* or calcareous nodules, in the London clay at Sheppey, the Kimmeridge clay at Weymouth, the Oxford clay, &c. Similar material occurs in bands in the lias at Whitby, and elsewhere. Good hydraulic cement is made by mixing the river mud of calcareous and clayey districts with chalk. Admixtures of burnt clay as well as pozzuolano and trass, have also been found to render fat limes hydraulic. Portland cement, largely manufactured at the mouth of the Thames, is a mixture of chalk and river mud. Roman cement is formed of the nodules found near Harwich. In making cements the materials are pounded together under water, and afterwards dried and burnt. The cement is largely used for artificial stone, made up with broken and crushed brick, mixed with about ten or twelve times its weight of broken stones and pebbles. Portland

and Roman cements make an excellent concrete. Portland is in this respect stronger than the older manufactured Roman cement, but for many purposes there is nothing to choose between them. Gypsum (sulphate of lime) is collected and burnt, like common limestone, to manufacture a plaster or cement. The calcining of gypsum does not involve decomposition, but the water of solidification being driven off, there is left only a soft white powder called plaster of Paris; when this is united with water the water is reabsorbed, and the mass becomes first plastic and then solid. When mixed with weak glue instead of water, plaster of Paris becomes converted into *stucco*, a material also very largely used. When thrown into a vessel containing a saturated solution of alum, borax, or sulphate of potash, rebaked, once more powdered, and then moistened with a solution of alum, a hard plaster is obtained that takes a high polish. This plaster is called Keene's cement if made with alum, Parian with borax, and Martin's with pearlash. *Pozzuolano* is a volcanic earth of a reddish colour, originally found in the vicinity of Pozzuoli, not far from Naples. Similar material has since been obtained from extinct volcanic districts, especially in central France, near Andernach, on the Rhine, and even near Edinburgh. When used instead of sand in mixing with limes, these minerals render all limes hydraulic, and have been used in this way from time immemorial with great success. Coal-cinders and slags also hasten the absorption of the moisture, and facilitate the setting of the limes with which they are used. Artificial pozzuolanos are sometimes manufactured. Besides cements and terra cottas, used as artificial stones, many methods of imitating stone have been adopted. One of these, introduced some years ago by Mr. Frederic Ransome, deserves notice. It consisted of sand moulded with fluid silicate of soda, obtained by exposing flints in a steam boiler to the action of caustic alkali, at high temperature. At first Mr. Ransome supposed that by mixing sand and stone with the fluid silicate into a paste and exposing them to the air they would become solid. But stones thus made soon disintegrated. He then subjected them to the action of heat in a kiln, and found that at a bright red heat the silicate became an insoluble glass, unaffected by exposure to the air, and not cracking on exposure to frost. Stone thus made might be so porous as to filter, or so compact as to yield a material equal to Craigleith stone. Rubs and whetstones, garden vases, balusters, and various architectural features often constructed of terra cotta were thus produced, of superior quality and great durability. The stone thus made was found to become unsightly, owing to an efflorescence of sulphate of soda, and it was difficult to avoid disagreeable markings. The moulding of Ransome's artificial stone is easy and perfect, the shrinkage in the kiln extremely small. When finished it can be cut with the chisel. Its power of resistance to transverse strains exceeds that of excellent sandstones used for building, and is three times as great as the best limestones. To crushing weights its resistance is also remarkable. A two-inch cube sustained twenty-one tons. Ransome's "patent siliceous stone" was, however, too expensive to come into use on a large scale; and the ingenious inventor found a much cheaper and more satisfactory result by making stones and sand into a paste with the fluid silicate in the usual way, and then fixing the form instantaneously by dipping it into a solution of chloride of calcium, and producing a hard stone without drying or burning. It is difficult to form an idea of the rapidity of the process and the perfect result without seeing the experiment tried. The term concrete is generally applied to a species of rough masonry, consisting of gravel or broken stone mixed with lime, the lime being slacked upon, and in immediate contact with the gravel. The main uses of concretes are to distribute the weight of heavy constructions, and for backing coursed masonry where the walls are required to be of great thickness. Good concretes should set rapidly and completely, for to have any value all work in which this material is used, needs to be performed quickly; and therefore either hydraulic limes or mixtures are necessary. The former should always be used when they can be obtained. But though hydraulic lime is desirable, the quantity used should not be in excess. Some care in selecting the rough stones and caution in not making the concrete till the lime is already converted into mortar are essential. The rapidity of setting may be varied by admixture of different material. Artificial blocks of concrete are made. They require to be constructed with great care, of the best materials, and carefully rammed. If dried too rapidly they are apt to crack. The blocks are admirable when successful, but mischievous if carelessly constructed. Bituminous cements are used for street pavements to replace large flags. In our own country, where we have abundant supplies of natural flagstones, they are little thought of. In France they are extensively adopted. The materials for these pavements are of two kinds—one nearly pure, the other a natural mixture of bitumen and sand or carbonate of lime. Asphalte is the technical name for the bitumens commonly obtained for pavements, and they are abundant in France, at Seyssel, and elsewhere. The best asphalte is black, brilliant, and hard at ordinary temperature. It softens in the sun. It should be free from sulphate of iron, and from sulphur in any form. When used it requires to be mixed with mineral pitch in a boiling state, and then formed into a cement, a little quicklime being added while the bitumen is boiling. There are many other applications and contrivances requiring geological knowledge to make use of them to the greatest advantage, and a vast variety of cases in which some acquaintance with the nature, history, and origin of rocks, and some idea of their metamorphoses and of their associations, will greatly help the practical man to obtain the material he desires.

Twelfth Ordinary Meeting.

Wednesday, February 22nd, 1865; William Hawes, Esq., Chairman of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Giles, Francis, 42, Blomfield-road, Maida-hill, W.
Phillips, Thomas H., 10, College-crescent, Finchley-road, N.W.
Savile, Edward B., 30, St. George's-road, Pimlico, S.W.
Spriggs, William, 10, York-row, Kennington-road, S.
Templetown, Major-General Viscount, C.B., Government House, Devonport.
Walker, Micajah Hilditch, 13, St. Swithin's-lane, E.C.
Warden, J. William, Warwick Cottage, Park-village East, N.W.
Yardley, Vincent, 3, Thorney-street, Bloomsbury, W.C.

The following candidates were balloted for and duly elected members of the Society:—

Edwards, Henry, 53, Berkeley-square, W.
Lambert, Charles, 3, Queen-street-place, E.C.
Runtz, John, Burlington-house, Stoke Newington, N.
Sandars, Samuel, 22, Sussex-gardens, Hyde-park, W.

The Paper read was—

ON THE MUNICIPAL ORGANISATION OF PARIS, PARTICULARLY WITH REGARD TO THE PUBLIC WORKS.

By George R. Burnell, Esq., F.G.S.

It seems that, at the present day, the results that have been obtained by the organisation of the service of public works in the neighbouring capital, have dazzled the public to such an extent that it would not be surprising were an attempt made to introduce some imitation of that system into our own country. Paris has been transformed with almost fairy-like rapidity; it has been improved in its hygienic and its general character; it has become essentially the city of pleasure, and the abode of the man of intellect; public buildings of a fine monumental character have arisen on every side; and at the same time the service of the city, in so far as regards the daily wants of life, has been largely and well cared for. Railway stations have been opened, markets laid out, mairies, public schools, churches, hospitals built; and even theatres and places of public amusement have been founded with a degree of luxury of which we in England have no conception. The results that have hitherto attended the Imperial Government of France have, indeed, been such as to cause both surprise and admiration; but I think that they are the results of a system that would prove eminently a failure if applied in our own country; and as I flatter myself that I know something of the innermost details of the administration of that country, I have thought that it might afford you some instruction were I to give you an account of the municipal organisation of Paris. There is much to be learnt from what is passing amongst our neighbours, no doubt; there is also much to be avoided. It should be our duty to learn all that they do that is worthy of imitation, in order to place the administration of our capital upon as sound a basis as possible, after allowing for the different circumstances of the social organisation of the two countries.

The first things that strike the inquirer in the municipal organisation of Paris, are—1st. That the capital and two of the great cities of France constitute exceptions to the general law of *communes* that prevails in that country, and are administered in fact by what is called *le régime du bon plaisir;* and 2nd, that the "*régime*" in question is carried into execution by the instrumentality of the organisation that previously existed. Thus, in the other cities of France, the prefects have very little power; the maires and the municipal councils, which are freely elected by the public, have, in reality, the unlimited control of the funds raised from their fellow-citizens. In Paris, in Lyons, and Marseilles, however, the prefects of the department have a more direct action, and the *conseils municipaux* are nominated at the choice of the Emperor; the *conseils* have, in the latter case, only a consultative voice, which is easily controlled; the initiative of any improvement comes from the prefect, who is all powerful. Of course, the prefect is obliged to carry out the projects that he may form by the aid of the subordinate *employés* of the administration; and he is responsible, for the acts that he thinks proper to adopt, to the great tribunal of public opinion, which may be considered to be represented by the semblance of the municipal council that authorizes, or not, the measures for carrying into effect the resolutions of the prefect. But this system of control is very illusory, and it in nowise ensures that the resources of the towns should be laid out according to the wants of the population, or even according to their means of supporting the charges the works may involve. Hitherto, it is true, no inconvenience, or but very little, has been found to arise from this cause; because, in the first place, there had grown up in the cities of Paris, Lyons, and Marseilles, in the course of years, a state of things that made any change a change for the better; and, in the second place, because the prefects of those cities are all of them high-minded men, men of enlarged views, and men who could well understand the wants of the population whose welfare was entrusted to their care. But what would be the ultimate results of such a system, when the directing hand and head of the empire was withdrawn? It is impossible to speak in too high terms of the attention with which every want of the Parisian public, for instance, is considered. The Government is literally there a visible Providence, to interpose between the consumer and the producer; and it makes, as the French people themselves say, "*la pluie et le beau temps*" in affairs which we leave to the care of a real Providence, and try to shelter ourselves against as best we may. As far as they have gone, the results of the system applied by our neighbours have been satisfactory, and France has increased in splendour and in real comfort in a degree which passes belief; the worst of this system is that it depends upon the lives and the intellects of the men who carry it into effect, and it is always subject to the errors that they may commit in their appreciation of the wants of the community.

But it is hardly the place here to indulge in abstract theories of government, and our business is more directly concerned with the measures adopted in Paris to carry out the immense improvements of that city. As was said, the system of government consists in, first, a prefect of the *département de la Seine*, who is a senator, and is named directly by the government; second, in a *conseil municipal*, consisting of sixty members, under the actual presidency of M. Dumas, the chemist and senator; third, of the different members of the administration, that is divided into a number of services, all of which it will not be necessary to notice upon the present occasion, as they are connected with the duties of the prefect that concern other functions besides the execution of public works. The prefect, in fact, represents the town in all that concerns the action of the government, and in all legal proceedings that may be undertaken for the defence of the interests of the municipality. He is charged with the execution of the police, conjointly with the prefect of that department; with raising the taxes and the execution of the conscription, with the service of the national guard, with the administration of the hospitals, the public assistance, the public education, and, in general, with all that relates to the government of the town. In this he is assisted by the *maires* and *adjoints* of the different arrondissements of Paris, who are also nominated by the crown, but in nowise subject to the election of those they rule. As the division of Paris into *arrondissements* and *quartiers* will very frequently come under notice in the sequel, it may be as well to say here that the city comprises twenty arrondissements, each of which has a *maire* and his *adjoint*, and is further subdivided into four quarters in each arrondissement. As the duties that are fulfilled by the *maires* and *adjoints* are exclusively confined to their magisterial functions, excepting in so far as they prepare the lists of the electors, there is not much inconvenience found to arise from their not being themselves elected; but, as will be seen in the sequel, there are grave objections to the municipal council being nominated, and holding their office at the will of the Emperor.

When, under this system, it is determined to execute a great public work, the course adopted is as follows:—The minister in whose functions the building enters (for in France the Minister of the State, the Minister of Public Works, the Minister of Worship, the Minister of War, have to do with as many of the buildings of Paris as the Prefect of the Seine) causes his employés to study the project, make the preliminary estimates, attend the inquiry that is held into the necessity for the execution of the work, and then presents his estimate, and all the documents connected with the inquiry, to the Chambers, in cases where the national funds are concerned, or to the conseil municipal when it is only a question of the funds of the locality. In Paris, the course is for the prefect to transact this business with the chiefs of the department of the *Voirie*, at this time under the direction of MM. Tronchon and Deschamps, who are specially charged with the service of the setting out and regulating the streets of the city; but in every case the initiative proceeds from the prefect, who lays out the new lines of streets according to his own ideas upon the subject, and who is alone responsible for their direction to the Emperor. The project is then submitted to the Emperor in council, who decides whether it is of a nature to require the application of the law of public utility. The council of state orders an inquiry into this branch of the project, and, after hearing the various parties affected, it generally decides upon the question in favour of the prefect's design, and issues a decree to that effect. The project is then brought before the conseil municipal, who decide upon the opportuneness of the execution and have to provide the sums of money that are required. The deliberation upon the project thus presented by the prefect to the municipal council is a mere *pro-formâ* piece of business; almost invariably the decision of the council is that the work shall proceed, and then the orders are given to mark out the ground, and to proceed to ascertain the indemnity that is due to the proprietors who are turned out. This is an operation that is done at once, after due notice has been given; but the purchase of the land goes on after the construction of the new street has been decided on, let the estimates be ever so much exceeded. Upon the completion of the formalities, the prefect takes possession of the ground, and he either yields it to the "*Compagnie concessionaire*," with the understanding that they will pay for the sewerage and water supply, the works for leading the gas to the public lamps, the execution of the roadway and footpaths, and the construction of the houses according to a plan determined upon; or he proceeds to the execution of these works by his own agents, and he, of course, receives the proceeds of the sale of the land that is reserved for building purposes. The latter course was adopted in the commencement of the great works of improvement in Paris; the former seems now the favourite with the prefect, as it leaves the municipality free to employ its credit and pecuniary resources, wherever he may think most desirable.

The execution of the works is divided into several departments, which consist of, 1st, the *Voirie*; 2nd, the service *des eaux et égouts*; 3rd, the service *du pavé*; 4th, the service *des promenades et des plantations*; 5th, the service *des travaux d'architecture*; 6th, the superintendent *des logemens insalubres*; 7th, the service des Ingénieurs des Ponts-et-Chaussées; and 8th, the service of the *Carrières*.

The first of these comprehends all that relates to the plan of Paris, and to the proposed rectifications thereof. It embraces the setting out of the new streets; the fixing of the lines that are allowed to prevail; the projections on the public way; the numbering of the houses, the acquisition of buildings that are acquired by means of expropriation; sales and exchanges of land, &c. There are employed in this branch of the administration, in addition to the two gentlemen already named, seven surveyors, or *géomètres*; nine surveyors, who are charged with the topographical works; four chiefs of sections; and a countless number of subordinates, who are charged with filling up the details of the service. As Paris is now undergoing the process of being surveyed thoroughly, the number of *employés* in this department is very considerably above the average; but the numbers given may be taken as representing the normal composition of this branch. There are, in addition to it, twenty architects *voyers*, and twenty assistants, or two to each *arrondissement*, who have, in their functions, the observance of the laws that regulate party walls, and the numerous cases that continually arise with respect to the right of air, ventilation, and light, and to the right of support by the neighbouring property, that are always the source of complicated action in the interior of great towns. It is this branch of the service, as was said before, that the prefect consults in preference to the rest, for all that relates to the improvement of the town.

The services of the *eaux et égouts*, of the pavement, and of the promenades and public parks, are discharged by engineers of the Ponts-et-Chaussées, or of the state, who are specially detached from the ordinary service, and are allowed to enter into the employment of the city of Paris, whilst they retain their rank and privileges as members of that body. I think it necessary to dwell a little upon this point, because an imaginary distinction has been sometimes drawn between the town engineers and the engineers of the Imperial Government. All the engineers of Paris are members of the Corps Impérial des Ponts-et-Chaussées, whilst the works of the Louvre, which in a recent discussion before the Committee of the House of Commons were especially alluded to, are all under the direction of M. Lefuel, who is an architect, and who is responsible alone for the success of them.

However, the three services named are united under the control of, at present, M. Michal, *Inspecteur des Ponts-et-Chaussées*, who has the general supervision, and regulates, as the last appeal, the various departments. He has under him, M. Belgrand, *ingénieur en chef de 1re classe*, who is charged with the *service des eaux et des égouts*, or in fact who takes the management of all that relates to the *underground* works of Paris. Then M. Homberg, *ingénieur en chef de 1re classe*, and M. Rozat de Mandres *ingénieur en chef*, are charged with the superintendence of the paving, roadway, and footpaths, or everything on the *surface* of the ground; and M. Alphand, *ingénieur en chef de 1re classe*, is charged with the plantations, seats, sheds, lamps, and generally with everything *above* ground; so that these four gentlemen have very distinct provinces, and yet they are all of them subject to the control of M. Michal, who has the title of "Director of Public Works." M. Michal receives from the prefect, after the formalities of the inquiry into the expediency of the proposed lines of communication and the reference of them to the municipal council, have been fulfilled, the indications of the direction that the lines are to follow; and at the same time, the plan indicating the exact line of the properties that the city intends to buy. He then consults the engineers of the various branches of his service, and they prepare in concert a project for the sewers, the water supply, the gas piping, and the plantations; they prepare estimates and designs for the work, which are submitted to the approval of the prefect; and, if approved of by him, are at once executed. The principles adopted in these cases are to shorten as much as possible the distance between the extreme points to be connected, and to regulate the level; and it must be confessed that in the new streets and boulevarts lately formed in Paris, this has been carried out with very little attention to economy in the laying out the lines, or in the levels given to them; but there are occasions when it is necessary to respect a public monument, or to preserve a certain gradient in order to accomodate a sewer, that may give rise to some deviations from the strict rule thus laid down. The engineers are, it must be added, directly interested in carrying out the works in the best manner, for they are charged with their maintenance, and their working afterwards; and as the city exercises a vigilant control over the sums allotted to this branch of the service, the engineers are kept thereby constantly on the stretch.

The bureaux that are immediately under the orders of M. Michal are not so numerously constituted as those of his subordinates, for he has only a general supervision over the works, and the engineers of the various departments prepare all the details of the execution; he has, therefore, principally to do with the accounts, and with the transmission of the orders of the prefect. In M. Belgrand's office there are three *ingénieurs ordinaires de 1re classe*, who are charged with the superintendence of the works that are in process of execution, and one other engineer who is charged with the construction and maintenance of the steam engines that are employed for raising the water; the laying the new pipes that are from time to time required is performed by the *ingénieurs* charged with the roadway, but under the orders of M. Belgrand, and they also exercise a control over the sewers, which come under that gentleman's direction, both for their construction and subsequent working and cleansing. As the gas pipes are laid in the soil, it follows that they also come under the province of M. Belgrand, who regulates everything that is concerned with what the French call the "canalization," or the pipes that serve to lead the gas to the places of consumption; the quality of the gas, and the manner in which it is to be burnt, form, however, part of the functions of M. Alphand, the engineer of the promenades and public plantations, and he is assisted by a host of inspectors, verificateurs, superintendents, &c., who are charged with the details of the private lighting. The details of the *service des eaux et égouts* give rise to the nomination of a great number of employés, amongst whom the inspector de l'assanissement has a staff of seven assistants to superintend the communication of the houses with the drains or sewers; an inspector for the preservation of the hydraulic works that are connected with the distribution of that fluid in the fountains, the street plugs, and the pipes; an inspector who regulates the supply that takes place in the public offices and the departments of the state; eleven persons are employed in the office of the engineer charged with raising the water; twenty-eight persons are employed to receive complaints and reclamations, and to give the temporary orders for repairs of the pipes that are in communication with the private houses; 105 persons who are charged with opening and shutting off the water from the various places of distribution; and finally fourteen persons who are charged with the superintendence of the various reservoirs. The city of Paris, it is to be observed, undertakes the supply of the water that is consumed in that town, and it is now energetically at work to improve both the quantity and quality of the sources it resorts to; in the meantime it delivers the water to a company, which undertakes the works that are required by the subscribers for water, and accounts to the town for the payment of them. The company is paid for its intervention in the matter by an allowance which it retains upon the amount of the sums it accounts to the city for. The distribution is on the constant delivery principle, but it leaves a great deal to be desired on the score of height; indeed the tenure of house property in Paris is in fact opposed to the profuse use of water we are accustomed to in England, and the supply may be said to be more municipal than it is domestic. It serves to wash the streets and to feed the monumental fountains more than it serves the household wants of the inhabitants, who, by the way, have learnt to pass over the deficiency of many things that in England are almost necessities of life. There is a strict relation between the services of water and sewers which in Paris has received a good solution, so far as the removal of the refuse from the streets is concerned; but the whole of this subject is so complicated, and it would lead to details of such length, that I must reserve them for another occasion. I may here mention that the city of Paris has treated for the supply of gas with a single company, on very favourable terms for both that company and itself. The affairs of the company are at present under the management of M. Gayffier, an *ingénieur en chef des Ponts-et-Chaussées*, and of M. Camus, *ingénieur ordinaire*, of the same body.

The service of the "pavé" is arranged in the following manner:—M. Homberg, the *ingenieur en chef*, has under his orders five *ingénieurs ordinaires*, and they have the control of a certain number of *inspecteurs*, usually about two for each *arrondissement*, a number of *conducteurs* and *piqueurs*, about four for each *arrondissement*, and a number of *cantonniers*, about forty for each *arrondissement*. M. Homberg is charged with the superintendence of the parts of the town that were included within the limits of old Paris, but when the limits of the town were carried back to the fortification, the paving of the districts thus included was entrusted to M. Rozat de Mandres, who has four *ingénieurs ordinaires* under his orders, with the usual number of *inspecteurs*, *conducteurs*, *piqueurs*, and *cantonniers*. These gentlemen are charged with everything connected with the level of the streets, both longitudinal and transverse; they arrange the fall of the channels and the points where the water is to be delivered and to be conducted to the sewers; they have the choice of the material that is to be used, either paving or macadam, and they fix the manner in which it is to be swept and cleansed; they execute the borders, and they have a control over the execution of the footpaths that are under the special care of the householders, unless the city thinks proper to plant them, when they pass under the control of M. Alphand. In Paris the materials used for the roadways are the grès or sandstones of Fontainebleau, the porphyry of Belgium, the quartz rocks of various localities, the meullières of the Paris basin, and the bituminous rocks of the subcretaceous formations of Seyssel, Neufchatel, &c.; for the footpaths, they principally use asphalte, porphyry, and grès. The streets of Paris are models of cleanliness, and they may well bear comparison with those of London, or of any Dutch town, being managed upon a uniform principle, which our streets are deficient in. The gutters are carefully washed twice a day, and everything is removed from them before the inhabitants are abroad; and this is the more remarkable, because all the Paris houses are constructed without anything that corresponds with the dust bins of London, so that the Parisians are obliged to deposit everything in the shape of rubbish in the public streets. The engineer of the égouts, in fact, complains that his branch of the service is unfairly charged with the removal of much refuse that ought to be carried away on the surface; but this is a minor evil, which is amply repaid by the cleanliness and the good state of the roadways. Perhaps the street paving may be rather in a worse state than that of London is generally; but that is owing to the great expense of the materials employed in Paris; at any rate they never in that city expose their horses to the cruel task of wearing down the stones of their macadam, a system that prevails to a fearful extent, with loss to the parishes, be it observed, too, in our city that boasts so much of its civilization. In Paris the footpaths are, as was said before, under the special control of the householders, who can of course pave them in any way that they think proper; except in the new streets, where the city has executed them simultaneously with the roadways, and where the houses are made liable to a payment for their repair.

The bureau of M. Alphand, *ingénieur en chef* of the promenades and the public plantations, is composed of two *ingénieurs ordinaires* and a great number of inspecteurs, conducteurs, piqueurs, and cantonniers: there are also two architects, two *sous-inspecteurs*, one *inspecteur verificateur*, and a host of clerks. The attributions of the office are the superintendence of the planting of trees upon the boulevarts; the maintenance of the public parks; the establishment and maintenance of the public fountains; the decoration and the placing of the public lamps; the arrangement of the market places and the standing booths for public conveyances, advertisements, &c., in so far as they are unconnected with the building; in fact, the execution of everything that is concerned with the upper part of the public ways. In the discharge of these duties M. Alphand is assisted by the *ingénieurs ordinaires* of the *voie publique*, but as much as possible the services are kept distinct.

The *service des travaux d'architecture* is an important branch of the administration, but it does not exercise much influence upon the lines, or directions, of communication, excepting in so far as they may interfere with the existence of monuments of great artistic and national value; and it is for this reason, principally, that the advice of the architects is taken. Under general circumstances, the architect's business is confined to executing the public buildings on the spots that are designated for them by the prefect, and they have to prepare their plans, in conformity with the instructions they may receive from him, and in accordance with the limits of expense that he may judge advisable. At present, the *service des architects* is under the immediate presidency of M. Baltard, who has under him a *chef de bureau*, and a body of architects and inspectors charged with the maintenance of the Hotel de Ville and the various offices of the municipality. There are four architects-in-chief; one of whom has the direction of the buildings that are connected with the maintenance of public peace and the administration of justice; another, the building and maintenance of the places connected with public education; another, the places connected with commerce and the administration of the municipal laws and funds, such as the mairies, tribunals of commerce, octrois, &c.; and the fourth, the superintendence of the religious structures. They are assisted by four *contrôleurs* and about 15 local architects, and two local architects are also named to superintend the departmental buildings; they have, as is usual in the French administrations, numerous subordinates, and there is quite an army of architects that is charged with the construction of new buildings; the number of these is not less than 33 at the present time, and it is calculated that the town has not less than 250 architects, conducteurs, piqueurs, and superintendents in its employment—the greater part being permanently engaged.

The superintendence of lodgings constitutes but a small branch of the administration of Paris, and it does not come into play at all in the improvements that have lately been carried on in that city; so that it will suffice merely to mention, in passing, that this object forms one of those that seriously occupy the attention of the prefect and of the municipal council. The works that form part of the attributions of the ingénieurs des Ponts-et-Chaussées, more directly concern the inhabitants of Paris, because they often blend themselves with the works executed by the engineers of the same body detached for the service of the town. Generally speaking the works that are required to connect the capital with other countries, and with the chief places of the several department, the lines of internal navigation and the railways, fall under the care of the ingénieurs des Ponts-et-Chaussées; and we therefore find that the service of the Seine is organized in several bureaux, that is to say, the ordinary service, the service of the navigation, the service of repairing and maintaining the bridges, the service of the superintendence of railways. In this number are included about eight ingénieurs-en-chef, and about twenty-four ingénieurs ordinaires, who discharge duties that are very variable, and are rather indefinite in their nature, because they somewhat interfere with the duties of their colleagues; however, although the engineers of the state are under the immediate control of the minister of public works, they are, nevertheless, to a great extent, subject to the Prefect of the Seine, whose consent is necessary for any great operations that they may be called upon to perform. The same thing may be said of the service of the engineers who are charged with the superintendence of the works that are required for the consolidation of the quarries under Paris; these are composed of the engineer-in-chief of the mining engineers and two ingénieurs ordinaires of the same body, and their duties consist in the superintendence of the catacombs and the foundations of the public buildings. It is found necessary to organize a special service charged with this duty, which the prefect is obliged to consult whenever a new line of communication is to be established; but it is only as a precaution, and to ensure the safety of the buildings about to be erected. All the last-named branches of the administration only have the right to interfere with the prefect when his measures are likely to trouble the public convenience or security; and therefore they are only mentioned incidentally on the present occasion.

But it remains for us to ascertain how the prefect manages to provide funds for the total change that he is effecting in the plan of Paris, and in the improvements there carrying out under his energetic management. In the first place, the revenues of the town are of themselves very large, and they have been pledged long since to meet such of the expenses as are authorised by the government; and in the second place, the city of Paris has entered upon the abuse of its credit, by the creation of a species of floating debt, that I think will end in bankruptcy. The yearly receipts of the town of Paris are (or were last year) 155,590,040 francs, or £6,223,600 nearly, which are raised from a population of not more than 1,667,841; and this, it must be understood, only represents the sums that the inhabitants pay for their local taxation, for the government taxes, that are levied directly from the payer, are quoted at the sum of 33,411,718 francs, or the additional sum of about £1,335,468. This sum of about six and a quarter millions would amount to an annual payment of about £3 15s. per head of the population, and it cannot be a matter of surprise that the expense of living in Paris is becoming rapidly unbearable. The incidence of the taxation is no doubt disguised by reason of its indirectness, but this only makes it more heavily felt by those who do consume the articles taxed. A man pays in Paris according to his consumption, not according to his means; and thus the rich man escapes contributing to the state. The poor man is forced to pay more in proportion than his neighbour. Of course Englishmen have nothing to do with the manner in which the French may levy the revenue that they may require, but it is right to call attention to the radical unfairness of the system, when so many people here are clamouring for the introduction of a similar one amongst ourselves. As it is, however, the rate of local taxation may be taken at nearly 50 per cent. on the rental of the inhabitants of Paris, including, however, all the relief of the poor, the expenses of the hospitals, the schools, &c., which with us are left to the care and charity of private individuals.

But it is to the creation of a description of municipal floating debt that the most impartial people lock with the greatest dread. The city of Paris, even now, has a funded debt that gives rise to the payment of 13,428,746frs., to defray the interest, and 10,314,892frs., for the sinking fund, or nearly a million a year is thus absorbed out of the 6¼ millions raised by the town. This is not all, however. The prefect has been allowed to issue obligations in the name of the city, and for the caisse des travaux de Paris, to the extent of 80 millions of francs, or for £3,400,000; and, if reports are to be credited, so far from his being contented with that enormous sum, he has extended it to the amount of 38 millions of francs (or £1,500,000 nearly) in the case of the works undertaken in the Boulevart Magenta. It is precisely the danger of this abuse of the credit of the town that is to be feared, and it is in this respect that the absence of anything like a controlling power in the municipal council of Paris is to be deplored. As the members of this body are all of them merely government nominees, and hold their places only as long as they vote the budget that is presented to them, the conseil municipal of Paris becomes nothing more nor less than a body chosen to give a semblance of legality to the proceedings of the prefect; it is utterly powerless to resist or to oppose any measure that he may have determined. Hitherto there has been no such result as was to be expected from this ignoble parody on municipal government, and Paris has gained in healthiness, in beauty, in convenience; in fact in everything that tends to make life valuable in large towns. The administration of the city funds is confided to a series of officers, who conduct their business with singular skill and attention to the public interests, though it must be confessed that they have allowed the spirit of red-tapeism, in the conduct of it, to gain the ascendancy; but these officers are not empowered to resist the will of the prefect if he should venture to step beyond the limits of his duty. They are only to discharge their functions; they have no deliberative voice, and they must carry into effect the orders that they receive from higher powers than their own. There is no kind of check upon the fancies or the caprices of the Prefect of Paris in fact, and it cannot therefore be a matter of surprise that he should have been misled in many cases, and should have made the mistake of confounding straight streets with good lines of communication, and broad boulevarts with efficient means of ventilation. I fear that much of what has been lately executed in Paris, especially in the neighbourhood of the Madeleine and the Parc Monceaux, is liable to this reproach, and certainly it would have been long before the town would have been thus modified, if the conseil municipal had been freely chosen, or if it had correctly represented the wishes of the inhabitants. There is, moreover, this danger about the course that our neighbours have entered upon, that they have created a fictitious demand for labour of the highest and most dangerous class, which they must go on employing; and thus the necessity of always continuing the works at the expense of the town is a constant source of preoccupation to them. The true remedy to this state of things, to the danger of the gradual increase of the debt of the city, and the creation of the fictitious demand for labour, would be, in my opinion, to restore to the municipal council some sort of control over the money of which they are supposed to regulate the application. It is to the facility with which the prefect can create a new debt, and the utter absence of control over his proceedings in this matter, that the danger of the present state of affairs in the city of Paris must be attributed.

In the meantime, the results of the system, in everything that relates to the maintenance of the public works and the comfort of the citizens, must be considered to be as nearly perfect as it is possible to make it. The streets are admirably kept, their surface is admirably paved, and their gutters are washed and swept twice a day, so that every kind of obstruction to the flow of water in the channels is removed with the least possible delay. The footpaths are not so well organised as the roadways, on account of the law which regulates them; but this branch of the municipal service is under a gradual system of change, and the consequences of this are very apparent in the state of the footpaths of the new streets and boulevarts. The gas lighting is very well performed, under the direction of the town authorities, and it is carried on with such an amount of luxury in the district around the Louvre and Tuileries, that in the Rue de Rivoli there is a gas lamp at the distance of every fourteen feet, and in the courtyard of the new Louvre there is one every twenty feet apart; nor can this be considered exceptional, as there is the same profusion of light at the Bourse, at all the theatres, on the Boulevarts, the Place de l'Hotel de Ville, &c. The service des eaux et des égouts is very efficiently organised, and though Paris is still subject to the nuisance of the night-carts, it is so in a less degree than formerly, and, at any rate, the inhabitants of that city cannot reproach themselves with the pollution of the river by their excreta. The water supply to the town is conducted, at present, on a very confined scale, but much of the inconvenience thus created must be attributed to the conditions under which household property is held in France generally. The city of Paris is, however, energetically at work to cause the insufficiency of its present supply to cease, which desirable object it is calculated will take effect in the course of the next summer. It would not enter into my province to notice the superior decency and cleanliness that are to be observed in the streets of Paris, which form so marked a contrast with the sights and scenes that one is compelled to witness in London; but this must strike every beholder, and give him a higher idea of the municipal organisation of the former city. There are ample provisions made for the markets, the cattle and the wine trade (and the former of these is now to be shortly brought to the immediate neighbourhood of the town); the factories are under strict superintendence, and they are kept from becoming nuisances to the neighbourhood in which they may be placed—in fact, the municipal affairs of Paris are managed with a degree of skill that must excite our admiration, in spite of the facilities that are afforded by the system on which it is based for the indulgence of the æsthetical fancies of the prefect, or of a much more august personage. It is to be feared, as has been said, that these will lead the city to great expense, if some check be not soon placed on them. Long lines of streets and long avenues, or boulevarts, cannot be constructed without costing a great sum of money; and though it may be desirable to terminate every vista with a building surmounted by a dome, in the style that seems to be the fashion in Paris at present; yet the question of the cost of these improvements must rise up before the inquirer, and the consideration is forced upon him, whether the circumstances of the town were, or are, such as to render necessary so great an outlay as these domes, and the houses around them, must cost? That which we should do well to imitate in the French system is, the order that prevails in the organization of their services for ensuring the fulfilment of the municipal duties; that which we ought to avoid is, the manner in which the Prefect of the Seine is allowed to dispose of the money of the taxpayers without any real control on their part of the funds so raised, or of the works that are undertaken avowedly for the public benefit. It may not be in the present day that the evil which will inevitably attach itself to the exercise of the irresponsible power of the prefect will be felt; it must, however, sooner or later, entail such consequences as are fearful to contemplate. As long as the system of irresponsible government is confided to intelligent and conscientious men, there possibly may not ensue from it the results that are to be apprehended; but this is always a matter of chance, and the results that would attend the corrupt, or even the unintelligent, use of the power so given must be evident to any one that reasons upon the matter. At present there may be questions raised as to the necessity, or the usefulness, of some of the public improvements executed by the city of Paris; as to the consequences of the future development of the system, it is to me evident that they must result in the embarrassment of the city and the augmentation of the burdens upon the citizens. The very perfection of the organization of, and the unity of system involved in, the services of the municipality seem to me only to disguise the defects of the system of which they form part, for they will allow the working of it to proceed, till it will at length collapse by the debt in which the prefect, or his successor, will involve the town.

I have not thought it worth while in this notice of the municipal organization of Paris, to describe the machinery that is put in motion for the purpose of making the inquiries into the expediency of declaring the works that the prefect may decide upon as being of the class that would come under the law of expropriation *pour cause d'utilité publique*, because the action of this machinery is very simple, and it is easily made to decide according to the wishes of those in power. The question of compensation for the property taken is in France, as in England, very much a matter of chance; that is to say it depends upon the skill with which the proprietor can make and support the claim that he may think proper to advance; for there is no rule by which the jury can fix the value of the land, or can ascertain the amount of the interest that may be attached to the properties or property under conditions that may escape observation. It is, however the general impression that the compensation that has been generally given in the cases of the new streets and boulevarts has been large, and ample for the purpose; so much so, in fact, that the proprietors of land and houses desire now to see the improvements carried on in their quarter, in the hopes of being expropriated in their turn. But this is in itself an evil, as the proprietors can only secure the high prices that they expect, on the condition of the public paying more for their property than it is worth; and the fact of some people getting more for their land does not compensate for the injustice that others may be exposed to. The system in France is, nevertheless so closely like our own in its essential features that I have not thought it necessary to direct your attention to it particularly. I have thought that the municipal organization of Paris, with all its strength, and with all its weakness, was a fit subject for your consideration; and as such I beg to recommend it to your careful study.

DISCUSSION.

Mr. NEWTON WILSON took exception to the introduction into the paper of so many French terms, which he thought would have been more intelligibly expressed to the meeting at large in English. He had carefully observed the Paris system; and the immediate question which arose for discussion was the comparison of the results between the principles of management in London and in Paris, and the powers of the municipal bodies in those cities respectively. One thing he would especially refer to was the subject of gas. The inhabitants of London had been complaining—not without cause—of the monopoly in and the high price of gas, but they might look upon London as an elysium in that respect when compared with Paris. Gas in the latter city was as complete a monopoly as could possibly be conceived. The gas consumer in Paris was called upon, in the first instance, to deposit a certain sum with the gas company; he had then to pay the expense of putting in the service; and, in the next place, he had to deposit a further sum for the meter, amounting to about 6s. on every burner used. The result was that the gas company was able to divide about 30 per cent. on the paid-up capital out of the monies deposited by the customers as security against bad faith on their part. He quite agreed with Mr. Burnell as to the badness of the pavement in all but the very best streets of Paris. The huge square stones in the back streets were about the worst pavement that could be put down. In the boulevarts and principal streets the paving was, however, all that could be desired; and the barbarous custom of treading down the macadamised roads with horses and vehicles, as was done in this country, had happily been abolished in Paris.

Sir Thomas Phillips, Q.C., thought that just at the present time it required a large amount of courage to stand up in favour of the state of the streets of London, as they were certainly now in a particularly dirty condition. Notwithstanding the hypercriticism of the last speaker, he thought the paper was one of considerable interest; and the justification for the use of the French terms was found in the fact that these phrases applied to official persons, who were distinguished by the names there given to them, and all ambiguity was avoided by using the precise French description of their official position. The condition of the Paris of the present day, as compared with the Paris of twenty years ago, was a subject of considerable interest. Much of the change that had taken place was no doubt owing to the remarkable man now at the head of the French empire, who was now publishing to the world his history of the life of Julius Cæsar, but it would seem that he himself sought rather to resemble another Roman Emperor —Augustus Cæsar, whose boast it was that he found Rome brick and left it marble. It would be something of a similar result which the future historian of the French empire would have to record when he came to sum up the claims of the present Emperor upon the gratitude of the French people. There had been undoubtedly great improvements made in Paris. That celebrated writer, Madame de Stael, in her work on France, took occasion to describe the almost impossibility in her day of getting any public improvements in that country. The municipality met to consider the want of a new street or bridge; after much discussion they came to the conclusion that something must be done: but there must first be a report to a central body, the Ponts-et-Chaussées; and perhaps years might elapse in the various passages from board to board, and from office to office, before the work was either carried out or decided not to be done. In contrast to this, it had always been a distinguishing feature of our own country, that when any great public work was projected—whether it was a railway, a bridge, a dock, a canal, or a road—we did not go to a government board to get the work executed, but having once determined upon it, we carried it out ourselves. Undoubtedly there were in this great metropolis many examples of works done by the municipal bodies, but he thought in the majority of cases those works would have been better performed by associations of the people themselves. Moreover, it could not be matter of necessity that the streets of London should be in the condition they were in now; surely there must be a means of having something like central action. Take, for instance, the breaking up of the streets for laying down gas or water pipes; surely it was not necessary that in the best portions of the year main thoroughfares should be constantly broken up to lay down gas-pipes in the first instance, and re-disturbed at another time to lay down water-pipes. At the period when there was no Metropolitan Board of Works, and when there was no unity of action in these matters, he could understand the existence of these evils; but now he thought they might expect that these works should be undertaken with something like conjoint action and with a minimum amount of inconvenience to the public. In looking at the vast improvements that had been carried out in Paris, there was one subject which had been greatly neglected, and that was the effect of these improvements upon the great masses of the working people. In making a new street, large numbers of the working classes were displaced, without any means being taken to provide them with dwellings elsewhere. He knew that the inconveniences in this respect were very great in London at the present time. He had had occasion to sit for some of the local judges, and many cases occurred of applications for warrants for the ejectment of tenants from their habitations, which he was bound to grant; but no one could witness the extent of suffering occasioned by the inability of the poor man to provide himself with another lodging, without feeling that a great evil had been created by turning these people out of their dwellings—bad as these often were, and wanting in all proper sanitary arrangements—without any provision being made for their accommodation elsewhere. The House of Lords, acting—if not on a standing order, at least with a sense of its duty in that respect—required that whenever a railway or other public company took powers to pull down working men's dwellings, they should, in some shape, be bound to provide other accommodation for the persons thus displaced. While on this subject he would refer to the plan now before Parliament for concentrating the courts of law in London. It was, undoubtedly, an important project, and would be highly convenient to all who were connected with the administration of justice; but he hoped, in the prosecution of that plan, it would not be forgotten that a large number of the dwellings of the labouring classes would be pulled down, for whom it was the duty of the authorities to make some provision elsewhere. He believed that civilisation, as they called it, as it progressed in all its various stages, must tread hardly upon the poorer classes in some respects; but it behoved us all to take care that the pressure was lightened as much as practicable, and that in carrying out improvements for the advantage of civilization and progress, we did it with the least amount of sacrifice on the part of those who were not in a position to help themselves, and who had large claims upon our protection. With regard to the great works executed in Paris, Mr. Burnell had spoken of their great architectural beauty, but there were no doubt differences of opinion on this point. Many people like himself might regret that the picturesque features of the city, and the old historic associations connected with it, had been swept away. He did not mean to say that none of its ancient monuments had been preserved, but the great characteristics of the city seemed to have been wholly destroyed by the improvements that had been executed there.

Mr. Lavanchy could not but express his admiration of the observations which had just been addressed to them by Sir Thomas Phillips, but on going through the paper he felt there was one statement in particular in it which he could not allow to pass unnoticed. The impression conveyed in the paper was that the prefect was the leading if not the sole authority in all those matters of public improvement involving so large an expenditure of money. He was quite sure that an error of that kind had not been intentionally made, but the fact was, that any great public work of the nature described must be accepted and approved by at least three separate bodies or commissioners prior to its being laid before the Conseil d'Etât, and if approved by that body it was finally submitted to the Emperor, and, if sanctioned by his Majesty, was referred back to the prefect to be carried into execution. With regard to the cost of many of these great improvements it was well known that this was not borne exclusively by the municipality. The sites having been purchased by the prefect, they were re-sold by tender to companies or individuals, by whom they were disposed of to the different parties who built upon them. He thought it was much to be regretted that some such plan as this was not adopted by the Board of Works in regard to the public improvements in London. As to the large prices paid for land in Paris, he thought that was a matter which we were scarcely in a position to criticise, looking at the enormous sums demanded for building sites in the City of London at the present time. We must first remove the beam from our own eye before we ventured to take notice of the mote in the eye of our neighbours. There was no question whatever that Paris had been very greatly improved, and history in calmer moments would do justice to the Emperor, and would acknowledge the debt which the French people owed to him.

Mr. Beloe congratulated Mr. Burnell on having introduced this paper on a subject which was deeply interesting to those who, like himself, were connected with municipal administration in the provinces. The anticipation of hearing this paper had brought him up from Liverpool, because, as a member of the municipality there, he felt that it would be most useful to them to learn what was done in other places, particularly in Paris. On the subject of the grand improvements that had been carried out in that city the paper afforded valuable information, but it did not state how the rates were levied upon the inhabitants for the purpose of these great improvements. He regretted to hear that the water supply of Paris was at present only on a limited scale, but that regret was modified by the statement than an augmented supply might shortly be expected. The water supply of Liverpool and Manchester was happily of the most ample and satisfactory kind, and had been carried out by the municipalities of those towns irrespective of the cost to the public. He regretted that the endeavours made by the Government some eight years ago to effect an arrangement with the water companies of London, by which, under the Board of Works, a general supply of water to London could have been obtained, had been defeated. He desired to express how gratifying it was to him to see the reading of papers of this kind encouraged by this Society, as it was most interesting to know what was being done in other parts of Europe, and he was sure great benefits must ensue from the introduction and discussion of so important a subject.

Mr. Webber ventured to think, judging from what they had heard in the paper, that, instead of these improvements resulting from municipal organisation, they had sprung, in fact, from an imperial organisation. He was struck with admiration at the picture of cleanliness and good order which had been presented in the early part of the paper, as regarded the streets of Paris, and began to blush for our own dirty thoroughfares; but when the cost was mentioned he became more reconciled to the present condition of things at home. It might be said that London had outgrown its municipal institutions. Hence there had of late years been created another and more extended authority, the Metropolitan Board of Works, which, however, had accomplished less than was expected of it. Could they not learn a useful lesson from what had been done by the municipal authorities of Liverpool and Manchester? In the case of the latter city a river divided the municipality of Manchester from that of Salford, but there was combined action, and the results were most favourable.

Mr. Nash apprehended that this paper had been brought before them with the view of their being able to derive some useful practical lessons from what was done in Paris. He thought the municipal institutions of London generally were very defective, and he inclined to the idea that the municipal administration should be made something analogous to the political constitution of the country—King, Lords, and Commons; that while the representative body should be elected by the people, there should also be an intermediate body, not elected, but which on all great matters should exercise its approval or veto. In Paris when a great work, such as a new street, had to be carried out, it was done in a far superior manner to London, for it could hardly be said that any one street had been properly laid out here, and until we could get good lines of thoroughfare London would never be beautiful and convenient.

Mr. Frederic Hill remarked that they had several instances before them showing that a despotic government, such as that of France, was not necessary to efficient action. There was the case of Manchester, where in the matters of the supply of water and gas, as well as in other respects, the municipal administration was most admirable. The same might be said of Liverpool and Glasgow, as also of some continental towns, particularly of Hamburgh, where municipal government prevailed to the fullest extent, and was entirely dependent on the will of the people. When the disastrous fire occurred in that city, by which a large portion of it was destroyed, the services of an English engineer were not only enlisted in stopping that fire, but the same gentleman was afterwards consulted by the authorities as to the best plan on which to rebuild the portion destroyed. The advice given was to adopt wide streets, building good houses, and taking a broad margin of land besides that absolutely required for the streets. The result was the handsome appearance which that city now presented, and the extra land taken rose so much in value that when re-sold it very nearly paid the expenses of the improvements made. The folly of the authorities of London in not acting upon similar advice given by Sir Christopher Wren, 200 years ago, was now universally admitted. He had had the advantage of seeing Paris at distant intervals, and had witnessed the wonderful improvements that had taken place in that city; the contrast he drew between London and Paris was very much to the disadvantage of his native city. In cleanliness, in the perfect order that prevailed in the streets, and in the absence from them of many of the disgusting exhibitions which were met with in London, Paris must be acknowledged to be greatly in advance of our own metropolis. At the time we were suffering from the offensive state of the Thames, he (Mr. Hill) called upon the Registrar-General, and stated his opinion that, however bad the state of the Thames might be, it was but a small matter in comparison with that of the vast area of the streets of London, by the dirty condition of which the public health was prejudiced. The Registrar-General admitted the facts, but avowed his utter inability to find a remedy, from the difficulty of getting districts and parishes to move in the matter, so that, under the existing municipal system it was almost hopeless to look for any permanent improvement in this respect. If they could induce one district to move he had no doubt the example would spread; but the thing was to make them start on the road to improvement. Mr. Hill also referred to the system of cleansing the streets in Rouen and Havre as worthy of imitation. On the subject of the election of members of the vestries and local boards of health, he thought an alteration of the present system was required; and he mentioned one parish in particular, in which he said the local authorities were elected almost entirely by the publicans of the parish, who appeared to have a repugnance to choosing really respectable people to represent them.

Mr. Hancock, in reference to the inquiry how the funds were raised for the improvements in Paris, stated that until recently they were derived entirely from the octroi duties. Not only were articles sent into France taxed at the frontier, but also provisions of all kinds at their entrance into the city. Hence the price of food within the city was considerably higher than beyond the barriers, where the octroi duties were not levied, and this had raised the value of land surrounding the city outside the barriers. He thought the people of this country would be very unwilling to submit to such imposts to carry out public improvements.

Mr. Jennings remarked that in dealing with the question of comparison, as between London and Paris, in the matter of public improvements, there were some material points which had not been considered. It had been observed that arbitrary power in these matters was the best power when well used, and that more could be effected by this means than by any other; but he trusted we should never wish to introduce arbitrary power into this country. With respect to the margin of land that should be taken in carrying out improvements, that which would apply to Hamburgh would not be applicable to London. The population of this metropolis was so large and so densely congregated that there were seldom any considerable spaces of yard or garden behind the houses. Where they could purchase poor property with large spaces contiguous, it might be profitable to take a margin for purposes of improvement; but practically in London it was far from profitable to purchase poor property. He thought in other respects more might be done in London than had been at present, if the Board of Works, which was comparatively a modern introduction, determined on some settled principle by which they could carry out a series of thoroughfares throughout the metropolis. That could not be done in the case of isolated improvements, but if they previously determined upon a comprehensive plan, it could be gradually carried on to completion. He did not agree with the view that no good streets had been planned in London. He thought the construction of Regent-street was satisfactory on the whole. Our difficulty up to the present time existed in the fact that the Board of Works had not the power to insist that streets should be laid out in a particular line. He thought it desirable that such a power should exist somewhere. He agreed that the Board of Works as at present constituted was not very popular, but there were very many able men on it, and he hoped they would be chosen as a committee to take up this important question. With respect to the dirty state of the streets, there was no necessity for its continuance. The streets in the City were swept every night, and he saw no reason why the same system should not be adopted throughout London generally.

Mr. Dalton was sorry to find that the Board of Works, of which he was a member, was still the subject of a considerable amount of censure, but he thought a little consideration of what they had done, and were now doing, would greatly alter the tone of those observations. They had been told this evening that the Board was answerable for the constant disturbance of the streets, in the laying of gas and water pipes; but he begged to state that they had no power to prevent this. Parliament gave gas and water companies despotic powers to take up the pavements where they pleased; and it was only by an Act passed the Session before last, that the Board of Works had power conferred upon them to prevent the entire stopping up of any street, without their sanction; previously to this, two great parallel thoroughfares—such as Holborn and Fleet-street—might have been blocked up at the same time. In the recent new streets formed by the Board, they had introduced subways, but these were opposed by the gas and water companies, and they would not use them when made. The Board could go no further than they had done in that direction. With respect to the great improvements carried out in Paris they had been told that a taxation of £3 15s. per head of the population had been the result; whereas the whole rates in respect of the main drainage and improvements of London did not amount to more than 9d in the pound on the local assessment, or about 10s. per head of the population. The Board was asked to make larger public improvements. Where was the money to come from? Would the inhabitants like to submit to octroi duties as they did in Paris? There was an outcry the moment an increase of the rates was spoken of. With respect to the Vestry, which was said to have been elected solely by the publicans of the parish, that arose entirely from the other parishioners not taking the trouble to look after their own affairs. It had been urged that the Board of Works ought to decide upon a comprehensive and definite plan of public improvements, but he might state that the Board had plans already before them involving an outlay of no less than £26,000,000. The present generation were called upon to bear the burden of the neglect of their forefathers. London had grown to a great extent without the thoroughfares being commensurately increased. The public were very hard upon the Board of Works; they would not give them the straw wherewith to make the bricks. The great work of the main drainage of London, for which the Board was originally constituted, was nearly completed. They had grappled with the question on which all previous Commissions had failed; and within the next two months the whole of the sewage of the south side, and two-thirds of that of the north side of London, would be conveyed away a distance of twelve miles below London Bridge. Much progress had also been made in the Thames embankment, which he did not hesitate to say was the finest work that was ever undertaken for London. The measures of the Board of Works would relieve the Thames of its pollutions; but their worth would to a great extent be nugatory if towns situated on the Thames above London were permitted to cast their sewage into its waters to be brought down by the stream. He hoped some legislative measures would speedily be taken on that subject.

The Chairman, in closing the discussion, said not the least interesting remarks were those of the last speaker, who had defended most ably, and, as he (the Chairman) believed, most accurately, the proceedings of the Board of Works, undertaken as they were under very great and special difficulties. A new system had been thus introduced into this metropolis which was calculated to produce effects almost, if not quite, as great as those in Paris, where the machinery by which they were brought about was such as would not be tolerated in this country. There was one observation in the paper which he did not think the facts brought before them justified. It was to the effect that Paris had gained in everything that tends "to make life valuable" in large towns. What had Paris gained? Some very remarkable streets and a great deal of elegant architecture. But let them see also what it had lost. Notwithstanding all the improvements in Paris, the sanitary condition of that city was inferior to that of London. How was that to be accounted for if London deserved the amount of abuse heaped on it? The real fact was that the health of the poorer classes was cared for in a higher degree in London than in Paris. Whatever might be the beauty of Paris, it was obtained by a heavy burden of taxation—enormously greater than in London—so great as to excite our surprise that it could be borne by the people. Although, however, the cost was enormous, the indirect return obtained by making Paris the centre of attraction for all the world ought not to be lost sight of. Then the question came, could we so beautify London as to make it a greater centre of attraction than Paris, and whether an equal expenditure in London would produce results equal to those at Paris? They must look to the matter of climate in the first place. London was subject to changes of climate and weather which were unknown in Paris. In the latter city the winter was cold, but dry and clear; in summer the heat was greater, but there were fewer wet days. In the matter of the cleanliness of the streets, the continuance of fine dry weather, both in summer and winter, was a great element. Then, again, there were questions involved as to the difference in the habits of the people. Would our population consent to be concentrated in flats, as was the case in Paris, with scarcely a house occupied by an independent family? Could the habits of the people be so altered as to forego that domestic isolation which was so characteristic of the English? While we continued to have separate dwellings, London must necessarily be spread over a very large district, and its roads and drains must be of such great extent, compared with Paris, that the difficulties were increased in proportion. The gentleman from the north (Mr. Beloe) stated that he attended this evening in the hope of gaining some information on points of local government, and he had alluded with great modesty to the remarkable works at Liverpool and Manchester for the water supply of those great towns. They were the first two cities in England which had applied the principle of providing a water supply without regard to the cost to the individuals using the water. They had bought a large tract of country, the rainfall of which was collected in reservoirs, conveyed to Liverpool and Manchester, and distributed without stint to the population, the whole cost of the service being maintained by the municipal authorities. But could such a thing be done in London? The geological and geographical formation was different. Liverpool was by the seaside almost on a dead level, and its water came from a high district 30 or 40 miles to the eastward of it, and was brought down by the slopes to the town. They had no such geographical facilities in London, and it would be far more difficult to distribute water by the means employed at Liverpool than by the present system. When they talked of hindrances and delays in public improvements occasioned by Vestries and Local Boards, they must look at the fact brought before them, that in Paris every public work had to pass under the cognisance of no fewer than eight distinct boards or commissions; and, under these circumstances, it was to be inferred that there was as much obstruction in getting through improvements in Paris as there was in this country, with all its faults. For his own part, he would rather see some of our difficulties, and some of our dirt, too, than have the alleged facilities and cleanliness accompanied by the despotic power which prevailed on the other side of the channel. He was sure they would join him in a cordial vote of thanks to Mr. Burnell for his valuable paper.

The vote of thanks having been passed,

Mr. Burnell, in acknowledging the compliment, said that it was too late in the evening to attempt to answer the various observations that had been made upon his paper; besides that, in consequence of his infirmity of deafness, he had unfortunately lost much of what had been said. He would, however, take the liberty of observing, with reference to the observations made by Sir T. Phillips and Mr. Dalton, upon the advantage of placing the gas and water mains in the same sub-ways, that Mr. Belgrand, who had considerable experience in laying of both gas and water pipes in this manner, had last year given evidence before the Committee of the House of Commons against that style of construction. Mr. Burnell added that he himself witnessed, on the 25th of last month, the effects of a serious accident which took place in Paris, in consequence of the adoption of the subways, and he warned the public that there were many dangers attending them. In this case, the gas and water-mains were laid in a sub-way, that was formed in the spandrils of the arches of the Pont d'Austerlitz. For some reason, the gas company required to alter their main; they, therefore, proceeded to shut off the gas on both sides of the bridge, and they left the gas time to escape, as they thought; an explosive mixture was, however, formed, and upon a light being accidentally presented, an explosion took place; the results of this were that one man was killed, three were wounded and carried off to the hospital, the water-main was started, and the pavement of the bridge was torn up throughout its whole length; the damage to the company was said to have been as much as £10,000. With regard to the observations of the Chairman, he (Mr. Burnell) must persist in saying that Paris was a city in which life was agreeable; and as a proof of this, he would only mention the fact that the mortality of that city was now very little above that of London. It appeared from the returns for the three years, ending 1862, that the death rate per 1,000 in Paris was 24·913, whilst that of London for the same period was 23·077. Mr. Burnell, in conclusion, said that he should be happy at any time to answer any letters that might be sent to him on the subject that he had laid before the meeting in the course of the evening.

Proceedings of Institutions.

Leeds Mechanics' Institute.—The annual meeting was held on Friday, January 27th, the mayor (President) in the chair. Mr. W. J. Neild, hon. sec., read the report, from which it appeared that there had been an increase of 26 members during the past year in the subscribers of the 12s. class, and in the 5s. ladies' class. In the proprietary members and 15s. subscribers there had been a decrease. The general summary of the library issue showed a decrease in the number as compared with the previous years' circulation, the half this decrease being in fiction alone. There had been a great increase in language, the result of an addition to the library of French and German literature. The Committee regretted that, owing to the Telegraph Company having advanced the charge for telegrams 50 per cent., they had been compelled to discontinue them. They had, however, introduced a considerable addition to the newspapers. Twenty-four lectures had been delivered The balance-sheet showed a deficiency, on the whole of the departments, of £21 18s. 5d. Upon the year's income and expenditure there was, however, really a profit of £45 9s. 1d., which had been reduced to the above loss by the school fees, &c., accounted bad. The reports as to the state of the Boys' School, the Ladies' Educational Institute, and the various classes, were most satisfactory. The School of Art also continued to improve in numbers and efficiency; the number of pupils had increased to 7,430; by the return of statistics received by the Science and Art Department, the school had a larger number of pupils connected with it than any school in the United Kingdom; and it had the widest local influence of any school of art. The financial statement as to the different departments was as follows:—The institution proper, income £776 4s. 7d., loss £45 2s. 2½d.; ladies' school, income £789 19s. 8d., profit £55 16s. 7d.; boys' school, income £699 7s. 2d., profit £51 8s. 0½d.; School of Art, income £468 11s. 4d., loss £86 17s. 11d.; evening classes, income £85 5s. 6d., profit £2 16s. 7d.; the new building £2,540 1s. 2d., balance in hand £2,481 1s. 8d. A special vote of thanks was passed to the president, Mr. J. D. Luccock, Mayor of Leeds, for the valuable services he had rendered during the year, and a richly-mounted cane was presented to him.—A paper was recently read by Mr. James Hole, the successful competitor for the prize of £5, offered by the Mayor of Leeds, for the best essay on "The Dwellings of the Working Classes in Leeds," the adjudicators being Messrs. W. B. Denison, T. Dawson, and John Taylor. Mr. Hole announced that his essay would shortly be published, and would be illustrated by a series of engravings of Akroydon, presented by Colonel Akroyd, and of the Crossley Cottages, presented by Mr. John Crossley. Mr. Walter Smith, head master of the Leeds School of Art, had also promised to contribute some drawings of the buildings erected in Leeds by the Model Cottage Building Society.

THE ROYAL SCOTTISH SOCIETY OF ARTS.

The Society met in their hall, 117, Henry-street, Edinburgh, on Monday, 23rd January, Mr. Charles Cowan, President, in the chair.

Mr. Alexander Ramsay, Manager of the Water Company, and Vice-President of the Society, read a paper, entitled, "Observations on the Rainfall on an area of 4,504 acres in the Glencorse District, in the year 1863, and in the separate months of April, May, June, July, August, September, and October (being the period of the drought) of 1864," of which the following is a short abstract:—

The object was to show the quantity of water delivered in Edinburgh, the quantity sent down to the mills, the quantity run to waste during floods, and especially the quantity absorbed by the land or lost by evaporation. The circumstances influencing the absorption and evaporation of the rainfall, and necessarily the quantity of water the district will yield, are varied in their character.

The author laid before the Society the results of a series of observations in the Glencorse Valley, over an acreage of 4,504 acres. These observations extend over the whole of the year 1863, and the months of April, May, June, July, August, September, and October of the year 1864, showing the quantity of water in the two reservoirs in that district, the rainfall, the quantity of water yielded by the rainfall, the quantity of water delivered in Edinburgh, the quantity sent down to the mills on the Esk, the quantity run to waste, and the quantity absorbed or evaporated, with certain relative proportions of rainfall applicable to these separate items.

There are two reservoirs in that district—namely, Glencorse and Loganlea—and the drainage area treated of is divided into two portions. The first of these consists of 2,694 acres, draining in the Glencorse reservoir from the embankment upwards; the second consists of 810 acres, being the lower portion of the drainage area, extending from the Crawley cistern to the Glencorse embankment. The aggregate drainage area is thus 4,504 acres. In dealing with this large area, the yield of the springs is not separated from the general drainage water of the district. The spring water, including that of Crawley, may be estimated at 60 cubic feet per minute as a minimum, to 80 feet as its maximum yield.

The rainfall from 1st January to 31st December, 1863, was 39·3 inches. The average of the previous ten years, from 1852 to 1862, was 33 inches. The highest year in the series was 1856, when it amounted to 40·8 inches. The lowest was 1858, being only 27·65 inches. The year 1862 was thus 6·3 inches, or 19 per cent. above the average of the ten years.

The 39·3 inches represent 642,536,136 cubic feet, which was thus disposed of:—

1st. There was drawn off for town supply a uniform quantity of 253·56 cubic feet per minute during the whole year, amounting for the year to	133,271,136
2nd. There was given off for the use of the mills on the Esk 220 cubic feet per minute, or for the year	115,632,000
3rd. The quantity run over the Glencorse waste weir, derived from the 3,694 acres draining into that reservoir, as ascertained by daily gaugings, amounted for the year to	254,241,072
And allowing the same proportion for the 810 acres, between the reservoir and the Crawley water house, there falls to be added........,	55,748,583
Making an aggregate waste during the year of	309,989,655
Out of the total rainfall, therefore, these three items account for	558,892,791
4th. The deficiency therefore is	83,643,345

or 13·017 per cent. of the whole rainfall due, and due exclusively, to absorption and evaporation.

The rainfall for the year having been, as already stated, 39·3 inches, is accounted for as follows:—

1. There was appropriated in town supply	8·150
2. In supply to mills	7·071
3. In waste	18·964
4. In absorption and evaporation	5·115
Making up the total rainfall of............	39·3

The quantity due to evaporation and absorption is smaller than the author was prepared to expect, and, no doubt, considerably below the average of ordinary years.

From the 1st April to the 16th October, 1864, a period of 199 days, the aggregate rainfall was only 10·89 inches, or at the rate of 19·974 inches in the year.

In order to bring into one view the leading particulars relating to the whole of the year 1863, and to the seven months from April to October inclusive in 1864, the following table was prepared:—

Fall of Rain and Appropriation of Rainfall on an area of 4,504 Acres in Glencorse District.

Cubic Feet of Water in Reservoirs on		Rainfall.	Cubic Feet of Rain.	Delivery of Water in Town.	Supply to Mills.	Waste by Overflow.	Loss by absorption and evaporation.	Absorption and evaporation equal to a rainfall of	Rate per cent. of loss by absorption and evaporation.
1863. January (1)......	77,144,193	Inches. 39·3	642,536,136	133,271,136	115,632,000	309,989,665	83,674,843	Inches. 5·124	13·17
1864.									
April (1)	77,144,193	1·09	17,820,976	11,105,928	9,636,000	...	8,219,880	·50	45·90
May (1)	66,003,355	1·90	31,064,088	11,105,928	9,636,000	...	17,113,884	1·046	55·00
June (1)	59,211,631	1·45	23,706,804	11,105,928	9,636,000	...	18,218,879	1·114	76·80
July (1)	43,957,628	2·20	35,968,944	11,105,928	9,636,000	...	29,684,644	1·810	82·25
August (1)	29,500,000	0·65	10,627,188	10,310,840	9,636,000	...	4,579,348	0·280	43·00
September (1)...	15,600,000	3·60	58,858,272	8,697,600	9,636,000	...	46,228,672	2·820	78·54
October (1	9,896,248	9·90	161,860,000	8,225,275	9,636,000	32,376,412	44,344,768	2·712	27·33

The mode by which the author had ascertained the loss was by accounting for the total quantity of water arising from the rainfall, and holding the difference between the rainfall and the quantity of water delivered in town, supplied to the mills on the Esk, and run to waste, as the loss due to evaporation and absorption.

In conclusion, the author stated that he greatly doubted whether there was any instance of a drought of a similar intensity and duration ever having occurred in that locality. During the whole seven months of its continuance, besides fulfilling their statutory obligations to the millowners on the Esk, the Water Company were able to maintain a supply to the inhabitants of Edinburgh, Leith, and Portobello, which only during six days, and these in the month of October, fell so low as 451 cubic feet per minute, or 20·23 gallons per head per day to a population of 200,000 persons.

Fine Arts.

EXHIBITIONS.—The collective exhibition of the works of the late painter, Hippolyte Flandrin, is now open in the new building of the School of Fine Arts in Paris. The proceeds are to go to the fund for assisting unfortunate artists.—A fine art exhibition is announced to open at Alençon on the 20th of May next.—The twenty-ninth annual exhibition of the Rhenish Association commences on the 15th of April. This society carries round its collection to all the towns belonging to the Association, namely, Fribourg, Strasbourg, Mayence, Darmstadt, Mannheim, Carlsruhe, and Stutgard, allowing from twenty-five to twenty-eight days to each place, and completing its labours on the 19th of October.—Besançon opens its exhibition on the 15th of March; Bordeaux, on the 1st of next month; Mort, on the 1st of May; Saint Brieuc, in the same month; and Toulouse, on the 15th of June.—The exhibitions of Lyons and Pau are now open. The Central Union of the Beaux-Arts applied to Manufactures, whose recent establishment of a museum and library in the Place Royale was described in the *Journal* a few weeks since, announces its annual exhibition to be held in the Palais de l'Industrie in August, and offers 300 francs for the best model or design for the medals to be awarded on the occasion, and which are to be in gold, silver, and bronze.—A general exhibition of industry and industrial art is to open at Chaumont at the same time as the annual agricultural show, which opens on the 20th of May.—Lastly, the Polytechnic Society of Stettin proposes to organise a general industrial exhibition, under the protection of the Prince Royal of Prussia, to open on the 15th of May and close on the 30th of June in the present year. It is proposed to cover a portion of the cost by charging exhibitors a very small tax, regulated either according to the value of their contributions or to the space occupied by them.

THE CARIATIDES OF SALONICA.—These well-known statues have been purchased by the French Government. Mr. Miller, who went out in May last on a mission from the Emperor, to make excavations in the island of Thosos, while waiting at Salonica for a boat to convey him to his destination, made a careful examination of the ruins of the Temple of the Cariatides, which for some years has been built against and enclosed within walls; he found the statues themselves deplorably mutilated, and it was evident, from the marks of recent fractures, that the work of destruction was progressing rapidly, and that before long these vestiges of ancient art would cease to exist altogether. Mr. Miller proposed to purchase them from the supposed proprietor, but this man asked such an exorbitant price as immediately put an end to that idea. Presently, however, it was ascertained that the Cariatides did not belong to the person in question, but to the Turkish Government, which, however, attached no value to the famous ruin, and had allowed it to be enclosed as above described. This fact discovered, Mr. Miller obtained the aid of the French Consul, the Marquis de Poncharra, and of the Pacha of Salonica, and, finally, with the assistance of the French Ambassador at Constantinople, Mr. Miller was authorised to carry the Cariatides to France. Another account of the transaction has appeared in the *Journal de Constantinople*, in correction of which the preceding statement has been published in a Paris paper.

ROYAL ACADEMY OF BELGIUM.—The Brussels Academy has issued its programme for the current year, and a portion of that for the succeeding session. The subjects selected for memoirs in the former case are:—1st. On the methods of teaching the graphic and plastic arts in the Low Countries and the province of Liège in all ages. 2nd. History of mural painting in Belgium, and polychromatic application to architecture, with the characteristics and methods of each epoch and each school. 3rd. The system of estimates for great architectural monuments erected during the middle ages, what portions fell to the architect or director of the work, and what were more particularly in the province of artists and artisans acting individually or in corporate bodies; also the modifications which have since taken place to the present time. 4th. History of landscape painting, with its progress and transformations, from the time it was employed as a mere accessory to that when it became a distinct study. The prizes are, for the first subject, a gold medal, of the value of 800 francs; for the second, 1,200 francs; and for the last two, 600 francs each. The subjects announced for the following session are:—1st. Analysis and appreciation, in a scientific as well as artistic point of view, of the principal methods of instruction in drawing which have been in use from ancient times to the present day; the value and influence of each. 2nd. Rubens as an architect. There are many buildings in Antwerp and Brussels attributed to Rubens—is this tradition founded on fact, or must the style which predominates in these buildings be merely attributed to the influence of the works of Rubens and his school?

Manufactures.

EXHIBITION.—At a general meeting of millers, to be held in Dresden, Saxony, in August or September next, there will be an exhibition of all mill productions, as well as mill stones, and all other implements connected with mills. Exhibitors from all countries are to be admitted.

MANCHESTER WORKMEN'S EXHIBITION.—On Monday afternoon, the 20th instant, a meeting was held at the Royal Institution, Manchester, for the purpose of opening an exhibition of productions contributed by working men. The lecture-hall was well filled. Sir J. KAY-SHUTTLEWORTH, Bart., presided, and there were present the Mayors of Manchester and Salford. the dean of Manchester, &c. The meeting was addressed by the Chairman, Mr. Alderman Heywood, and the Dean of Manchester. Amongst the objects shown may be mentioned some carvings of fruit and flowers, in Caen stone, by Mr. Green, a Manchester sculptor; a piece of stone carving, by Mr. W. Fasana, called "The Invader"—a serpent who is stealthily approaching a bird's nest; a carving of a dead canary, in box-wood, by a workman employed by Mr. Cowan; also one of Whittington listening to Bow bells. There are carvings in ivory, small models of steam-engines and machinery, architectural models of buildings, &c.

MIDLAND COUNTIES INDUSTRIAL EXHIBITION.—A public meeting was held at Nottingham on Monday, the 20th instant, for the purpose of promoting a working man's industrial exhibition for Nottingham and the midland counties. There was a large attendance of the working classes, and several gentlemen addressed the meeting, strongly urging that such an exhibition should be held. A resolution in favour of this being done was unanimously adopted.

STANDARD OF ELECTRICAL RESISTANCE.—Copies of the standard chosen by the Committee of the British Association on Electrical Standards, appointed by the British Association in 1861, can now be procured by application to Mr. Fleeming Jenkin, 6, Duke-street, Adelphi, Secretary to the Committee, the cost of a unit coil and box being £2 10s. The standard is a close approximation to 10,000,000 metre-seconds in Weber's absolute electro-magnetic system, determined according to new and careful experiments made by different members of the Committee, and the copies are constructed of an alloy of platinum and silver, in a form chosen as well adapted for exact measurement. The want of a generally recognized standard of electrical resistance has been universally felt, and led to the appointment of the Committee, who now express a hope that the motives which have led to their present choice, and which are fully explained in the several reports published by them, will induce all interested in the progress of electrical science to assist in procuring the general adoption of the new standard.

Commerce.

TOBACCO.—The exports from the United States of America during 77 years, in periods of seven consecutive years, are as follows :—

AVERAGE SHIPMENTS IN SEVEN YEARS.

Period.	Hhds.	
1787—1793	87,836	The first period is the seven years after the revolutionary war.
1794—1800	71,131	Second and third, during the European war.
1801—1807	81,112	
1808—1814	31,141	Fourth, includes war with Europe of 1812, preventing shipments during last two yrs.
1815—1821	73,358	The fifth to ninth periods show a steady and constant increase during 35 years' peace.
1822—1828	85,207	
1829—1835	85,567	
1836—1842	100,423	
1843—1849	126,267	
1850—1856	116,274	Tenth, a decline, at the end of which, in 1857, prices reached their highest point ever obtained in the three markets, in proportion to quality.
1857—1863	139,552	The last shows an average increase over every preceding one, notwithstanding that during the last three years the markets of Virginia have been closed.

ALLOYS OF SILVER.—The increasing rarity of silver lately induced the French Government to form an alloy for monetary purposes, consisting of 835 parts of silver and 165 parts of copper, and pieces of 50 centimes, with the figures 835 stamped upon them, are actually in circulation. The fabrication presents no difficulty, the malleability is nearly the same, and the slight yellowish tinge can only be detected by rigid comparison. M. Eugene Peligot has been making experiments, with the view of substituting zinc for copper in the alloy. The process employed is very simple, and the results of combination in various proportions are said to be very satisfactory. The fusibility of the new alloys is greater than that of the alloys of silver and copper ; they are very sonorous, elastic, and malleable, and no verdigris is formed by contact with acids. The most economic method of restoring the coinage would be the employment of the old silver in the new alloy. One per cent. of zinc is already employed in the French copper coinage, and this small proportion suffices to give qualities to the coinage which copper does not possess. The small Swiss coins made at Paris contain zinc associated with copper, nickel, and silver. M. Peligot has formed alloys in the following proportions :—Silver, 950, zinc, 50 ; silver, 900, zinc, 100 : silver, 800, zinc, 200. Ternary alloys—silver, 900, copper, 50, zinc, 50 : silver, 800, zinc, 100, copper, 800; silver, 835, copper, 93, zinc, 72.

Colonies.

TASMANIAN PRODUCTS FOR THE NEW ZEALAND EXHIBITION.—Recent accounts state that, though the subscription list is at present totally inadequate to the occasion, the products which have been sent in to the committee, or are ready when called for, are such as to be creditable to the colony, more especially considering the shortness of time allowed for appealing to the public. The list contains a great variety of Tasmanian timber in the shape of ordinary market woods, of blue gum and stringy bark, railway sleepers, &c., Florentine marble granite from the east coast, wheat, oats, barley, oatmeal, flour, ale, &c., Tasmania-grown field and garden seeds, silkworms, a wool press, a tobacco cutting-machine, &c.

TASMANIAN AGRICULTURAL SHOW.—The annual exhibition of the Northern Agricultural Society, which is now regarded as one of the principal events of the year, came off at Longford on the 2nd November last, and was beyond every other show most successful. The exhibition of horses, cattle, and sheep was unparalleled. What with the large number and general excellence of the entries, the judges had no easy task to perform. The attendance was about the same as usual, upwards of 2,000 people being present, and comprised visitors and buyers from all parts of the island, even the extremities—Hobart Town and Falmouth. The amount of admission fees taken at the gate was £108.

NEW SOUTH WALES.—AGRICULTURE.—The returns show that the wheat harvest was by no means so complete a failure from the rust as was generally anticipated. There was half a harvest—fully half of the average of the previous ten years. The produce is put down at 808,919 bushels; in the previous year it was only 1,054,954 bushels, and in 1856, the most productive year of the decade, it did not exceed 1,756,964 bushels. As the wheat harvest was known to be a total failure in some places, it seems to follow that in some others the damage done must have been very slight. The area of land put under wheat was 103,942 acres, less not only than in the preceding year, but than in the four preceding years.—The tobacco manufacture shows a very marked increase, the quantity produced in 1863 being 36,443 cwt. as against 3,755 cwt. in the previous year, and 1,587 cwt. in 1861. The principal seat of the manufacture is at Maitland. Recent attempts to grow tobacco on the Lachlan seem to promise favourably, and there seems every hope that the western district may become the seat of a prosperous tobacco agriculture as well as of a tobacco manufacture.—The quantity of sugar refined was 169,280 cwt., which was a slight increase over that of the previous year. There are five establishments in the colony, but only two of them were at work. This department of manufacturing industry would receive a considerable impulse if agricultural industry would but take the turn of sugar cultivation. Experiments tend to show that the soil and climate are admirably adapted to the growth of the cane, and that the profit on the operation would be far greater than can be obtained from any other branch of agriculture.

Obituary.

MR. SAMUEL GREGSON, M.P. for Lancaster, died on Wednesday the 8th of February. He was in his place in the House of Commons on the Tuesday evening. Shortly before three o'clock on the following morning he was seized with illness at his house, Upper Harley street, and died in three-quarters of an hour afterwards, in the 70th year of his age. He was the eldest son of the late Samuel Gregson, Esq., who filled the office of Mayor of Lancaster in the year 1825. Brought up in early life to rely on the result of honest perseverance and steady application, the character of Mr. Gregson was soon appreciated in the counting-house at Liverpool, where he commenced his commercial career. He was selected by his employers to positions of trust and confidence unusual for so young a man, and in course of time proceeded to Calcutta, where he developed a business, and ultimately returned home, establishing a firm in London which carried on commercial operations of great magnitude in the China trade, and for many years has continued to hold a high and respected position. In 1837, Mr. Gregson unsuccessfully contested the borough of Lymington, in Hampshire, and in 1847 he was first returned in the liberal interest for his native town, Lancaster, but was unseated on petition. At the next general election he was again returned to Parliament, and has continued to represent Lancaster ever since. For sixteen years he advocated a reduction in the duty on tea; he felt that to tax heavily the produce of China, while the Chinese were compelled to admit our manufactures at a low tariff, was unjust, apart from an anxious desire to see his own countrymen supplied at the lowest cost with such an important article. Year after year, therefore, as chairman of the East India and China Association, Mr. Gregson urged the subject on successive Chancellors of the Exchequer, and in February, 1863, he presided over an influential meeting of merchants and others for the purpose of obtaining a reduction, and in a few weeks afterwards had the satisfaction of hearing, in unusually complimentary terms, from Mr. Gladstone that the tea duty was reduced to one shilling per pound. In a similar spirit, though with less success, Mr. Gregson has urged the importance of reducing the duty on salt in India. Everything connected with the East met with Mr. Gregson's earnest attention, and as one who had realised the tediousness of corresponding with India round the Cape of Good Hope, he justly appreciated the facilities of the overland route opened up by Lieutenant Waghorn; he was an early promoter of the Red Sea telegraph, and had recently been occupied in the important question of establishing railways in China. He was respected by all parties. Though making no pretensions as an orator, whenever he rose in Parliament he was always listened to with respectful attention; and his advice, particularly on matters connected with the trade of India, was highly valued. He was always known as a hard working member of the House of Commons, regular in his attendance, and zealous in the performance of his duties. The building of a beautiful church upon the Moor, at Lancaster, was due to his liberality, as well as some handsome baths and washhouses. He was elected a member of the Society of Arts in 1853, and served for some time on the Council, where his advice was highly valued by his colleagues, by whom his loss is much regretted.

Notes.

EXHIBITIONS.—PROTECTION TO INVENTIONS.—On Tuesday Mr. Milner Gibson, in committee of the whole house, obtained leave to bring in a bill for the protection of inventions and designs exhibited at certain industrial exhibitions in the United Kingdom. The Dublin International Exhibition (1855) Bill was read a third time and passed.

ROYAL SCHOOL OF NAVAL ARCHITECTURE AND MARINE ENGINEERING.—A course of three lectures, on "Magnetical Errors, Compensations, and Corrections, with special reference to Iron Ships and their Compasses," is to be delivered in the Old Lecture Theatre of the South Kensington Museum, on Thursdays, March 9, 16, and 23, 1865, from four to five o'clock p.m., by George Biddell Airy, Esq., Astronomer Royal. The subject will be treated under the following heads:—1. Terrestrial magnetism, and the magnetism of permanent magnets. 2. Transient induced magnetism of iron. 3. Sub permanent magnetism of iron. 4. Correction of magnetic disturbing forces. 5. Magnetism of ships, especially of iron ships, and correction of their magnetic disturbing forces on the ship's compass. At the close of each lecture, the Astronomer Royal will wait to give separate explanations to any individual members of the class. Though single lectures may have previously been given, it is believed that this will be the first course of lectures on this important subject which has been delivered in the country.

RAIN.—In the *Journal* of last week, under the title What is an inch of rain? appeared an extract from the weekly return of the Registrar-General, respecting the rainfall. M. Petit, the director of the Observatory of Toulouse, speaking of the late heavy rains, says:—"The quantity is not so unusual as at first sight would appear. The average annual fall is about 60 centimètres, rather more than two feet English, spread over about a hundred rainy days, thus giving an average fall of about six millimètres for each day, or about six litres, 10 to 11 pints English, per square metre. The average of the heavy rains of the 15th, 16th, and 17th of January, in the present year, rose to about nine millimètres. Greater falls have often occurred in France. On the 19th of September, 1844, 35 millimètres of rain fell at Toulouse in thirty minutes; and on the 10th of August, 1859, there fell 59 millimètres in two successive storms of about forty minutes each in duration. . . . In recalling the impression of terror created by the sight of a precipice, one is inclined to ask how it is that we are not terrified at such enormous quantities of water being suspended over our heads. But the question appears under a still more extraordinary aspect when we consider the amount of heat required to vaporise all the water which we receive in the form of rain. When we remember that in the tropics there falls about two metres of water per annum; that in our climate we have never less than 50 or 60 centimètres; and that the masses of snow in the polar regions must also furnish a great quantity of water, it will readily be admitted that the annual rainfall must be, at least, equal to a stratum of water all over the globe of 50 centimètres, upwards of 19½ inches English. . . It is easy, with these facts given, to see that the evaporation caused by the heat of the sun must render to the atmosphere about 175,000,000,000 cubic metres of water per day, or rather more than 2,000,000,000 of litres a second. . . And yet the furnace is 38 millions of leagues distant from us!"

TEA-MAKING.—A correspondent of the *Times* says he finds, from careful inquiry, that it is usual to brew 64 pints from 1 lb. of tea leaves, to which are added 4 lbs. of sugar and 8 pints of milk—72 pints in all.

MEETINGS FOR THE ENSUING WEEK.

MON. ...Society of Arts, 8. Cantor Lectures. Professor Ansted, F.R.S., "On the Applications of Geology to the Arts and Manufactures." (Lecture IV.)
R. Geographical, 8½. 1. Mr. C. R. Markham, "On the Origin and Migrations of the Greenland Esquimaux." 2. Capt. Sherard Osborn, "Remarks on Dr. Peterman's letter on North Polar Exploration."
Actuaries, 7.
Royal Inst., 3. Prof. Tyndall, F.R.S., "On Electricity."
TUES ...Medical and Chirurgical, 8½.
Civil Engineers, 8. Renewed Discussion upon Mr. England's Paper on "Giffard's Injector." And, time permitting, Mr. H. B. Hederstedt, "An Account of the Drainage of Paris."
Zoological, 8½.
Anthropological, 8.
Royal Inst., 3. Professor Hofmann, F.R.S., "An Introduction to the Study of Chemistry."
WED. ...Society of Arts, 8. Mr. F. W. Campin, "On the Means employed in taking Fish, especially with reference to Submarine Illumination."
Royal Inst., 3. Prof. Marshall, "On the Nervous System."
Pharmaceutical, 8.
THURS...Royal Inst., 3. Prof. Hofmann, F.R.S., "An Introduction to the Study of Chemistry."
Antiquaries, 8.
Royal, 8½.
Linnæan, 8.
Chemical, 8. 1. Dr. Crace Calvert, "Action of Silicate and Carbonate of Soda on Cotton Fibre." 2. Dr. C. Calvert, "Bihydrate of Oxide of Phenyl." 3. Professor Bloxam, "Action of Chlorine on Arsenious Acid." 4. Mr. Church, "A New Cornish Mineral."
R. Society Club, 6.
Artists and Amateurs, 8.
FRI.......Philological, 8.
Royal Inst., 8. Mr. James Fergusson, "On the Temple and Holy Sepulchre at Jerusalem."
Archæological Inst., 4.

PARLIAMENTARY PAPERS.

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SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered during the Vacation* 1864.

483. Post Office Savings Banks—Return.
494. Public Accounts—Report, &c.
498. Friendly Societies (England)—Report.
507 (A III.) Poor Rates and Pauperism—Return.
544. Army Medical Reports.
466. Schools of Art—Report.
518. Railway Companies Borrowing Powers—Report, &c.
553. Isle of Man—Papers.
66 (VIII.) Trade and Navigation Accounts.
82 (I.) East India (Native Princes)—Returns.
497. Carlisle Cathedral—Further Returns.
474. Revenue—Returns.
475. Public Debt, &c.—Return.
569. Remittance of Public Money (Great Britain and Ireland)—Account.
452. Joint Stock Companies—Return.
507 (A IV.) Poor Rates and Pauperism—Return (A.)
549. Land, Assessed, and Income Taxes—Return.
495. Scientific Institutions (Dublin)—Report.
556. Harwich Harbour—Correspondence.
513. Taxation of Ireland—Report.
512. Bankruptcy Act—Report.
493. Trade with Foreign Nations—Report.
66 (IX.) Trade and Navigation Accounts.
513. Taxation of Ireland—Corrected Pages.
481. National Education (Ireland), Part I.—Return.
380. Telegraphic Communication (India, &c.)—Correspondence.
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,, ,, Third Report, &c.
Post Office—Tenth Report.
Public General Acts—Cap. 73 to 121 and Table.

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431 (B.) Poor Rates and Pauperism—Return (B.)
431 (D.) ,, ,, Return (D.)
493 (VIII.) Import and Export Duties—Return. Part (9.)
493 (IX.) ,, ,, ,, (10.)
538. Numerical List and Index, &c.
431 (B I.) Poor Rates and Pauperism—Return (B.)
431 (E.) ,, ,, (E.)
431 (C.) ,, ,, (C.)

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Patents for Inventions—Report of Commissioners.
Transportation—Correspondence.

Patents.

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Boots and shoes—190—J. Edie.
Cereal grains, manufacturing syrup and sugar from—221—G. Haseltine.
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Fire-arms, breech-loading—247—S., R., and W. Trulock.
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Grapes, ground vineries for the cultivation of—204—C. T. Wells.
Horse hoes and corn drills (lever)—279—J. Sainty.
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Inventions with Complete Specifications Filed.

Velvet ribands, &c., winder for—389—T. A. and M. A. Verkruzen.
Files, manufacture of—412—W. B. Newbery.

Patents Sealed.

2067. J. Walker.
2071. C. W. Harrison.
2099. N. J. Peton.
2237. Z. S. Durfee.
2247. J. E. Morris.
2264. R. Holt.
2430. W. S. Cowles.

From Commissioners of Patents Journal, February 21*st*.

Patents Sealed.

2068. F. Feichtinger.
2077. R. M. Black.
2082. G. Parsons.
2086. W. Spence.
2089. E. T. Bellhouse and W. J. Dorning.
2095. R. Beard, jun., and W. Downing.
2100. R. A. Brooman.
2102. G. Davies.
2102. G. H. and H. R. Cottam.
2107. M. L. Muller.
2110. E. Hunt.
2112. R. Marshall.
2114. E. Calvert & T. Edmeston.
2116. P. A. le Comte de Fontainemoreau.
2139. J. B. Andreux and C. Coulon.
2170. E. R. and S. Lloyd.
2171. E. R. and S. Lloyd.
2181. W. H. Perkin.
2194. T. Taylor.
2244. J. H. Johnson.
2253. A. M. Perkins.
2355. P. A. le Comte de Fontainemoreau.
2424. W. Clark.
2452. H. Conant.
2648. J. E. F. Ludeke and D. Wilckens.
2929. P. Haggie and P. Gledhill.
3019. G. Haseltine.

Patents on which the Stamp Duty of £50 has been Paid.

410. J. Cooke.
413. J. Chatterton & W. Smith.
423. E. T. Hughes.
461. H. Ward.
425. J. Combe.
571. H. Bowen.
719. J. Grant.
419. H., J., and R. Crawford, and R. Templeton.
465. R. and W. E. Pickin.
482. R. Foster, jun.
435. C. T. Marzetti and J. Watson.
448. J. Willcox.
459. J. Spence.
472. J. Kirkwood.
506. T. Watson and R. Dracup.
537. J. Tangye.

Patents on which the Stamp Duty of £100 has been paid.

279. W. Spence.
300. J. E. Boyd.
319. R. Griffiths.

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Pencil Clip—Feb. 3—4690—Michael Terrace, Birmingham.
The Spring Kingston Brace—Feb. 9—4691—W. Blenkiron and Son, 123, Wood-street, City.